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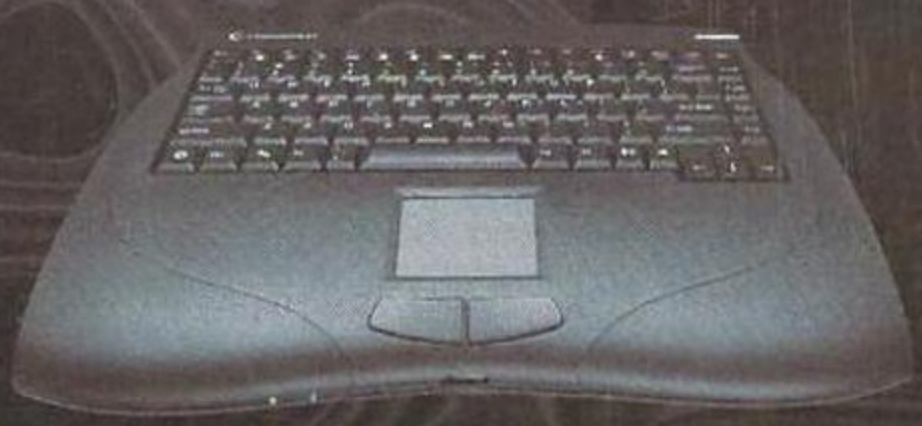

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COMMODORE WORLD
THE NEWS MAGAZINE FOR COMMODORE 64 & 128 USERS

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FROM THE EDITOR

Obviously there's something different about this issue of Commodore World. No mistaking that the cover has gone from full-color to shades of gray. But internally we have revamped things as well. Financial reality has meant either raising prices, or cutting costs.

Since we're reluctant to charge more for the publication, we've targeted some areas of the publication which we felt would have the least impact on the quality of the information provided.

We started by removing color from the cover, then reduced page count by removing the Triva and some of the CMD advertising. This didn't get us down quite as far as necessary, so we've lost some editorial space as well in this issue. However, some addtional shuffling and redesigning of certain pages will be completed for our next issue to regain that room.

All of this might lead you to wonder just how much longer Commodore World will last. As we've stated in the past, it is our intention to maintain the publication as long as possible by taking the necessary steps required to make this happen. The changes in this issue are an indication of us doing just that—insuring the magazine's longevity instead of dropping it when it is no longer profitable. To that end, we hope you'll understand that the changes taking place are necessary. And once the costs are under better control, we'll be able to take additional steps to improve the diversity of the content and regularity of publication.

Doug Cotton
Editor

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Generate some more legal documents which you can customize for your own use.

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Take a musical trip from the quaint eateries of the outer city into the heart of darkness we call "uptown".

Room - 4k Contest Winner
A small demo that gives you a glimpse of what the world of DOOM is like.

Twin Terrors
For one or two players, this exciting game offers 99 levels of jumping and shooting.

Gershwin Jukebox
Eight memorable tunes by George Gershwin, including Rhapsody in Blue (in three movements), the three Preludes, and Swanee, made famous by Al Jolson.

Quicksmith Music
31 songs by musicologist Dave, all converted into the QUICKSMITH format by Lee Novak.

Clip Joint #2
A geoPaint document chock full of attractive images just ripe for clipping.

Geos Disk Tools
Ten tools for the Geos environment that will make your navigation faster and easier. All are well explained by our Geos Man About Town.

Diskovery
Your editor confronts another crisis, mourns a prolific C-64er, describes a new product, and introduces a Euro company.

Jeff's Soapbox
Jeff mediates (or aggravates?) the battle of the operating systems.

Centsible Software
A list of 50 commercial "in the box" programs from the world's largest CBM software store.

Modern Printers
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ON THE HORIZON

COMMODORE AND COMPUTER INDUSTRY NEWS

New Commodore 64?

A lot of rumors have been floating around lately over the supposed release of a 'new' Commodore 64 computer. The reality of the situation is that Web Computers International (WCI), a Dutch-Antilles-based firm with facilities based in Antwerp, Belgium, has recently released a low-cost Windows-PC with a built-in Commodore 64 emulator. For additional details, see the feature article elsewhere in this issue.

The Internet for Commodore Users Updated

Encouraged by strong international sales, VideoCam Services has updated and published a third edition of "The Internet for Commodore C64/128 Users" (ISBN: 0-9585837-0-6). The book has been expanded with an additional chapter covering TCP/IP Connections. With recent hardware and software released for the Commodore computer, it's only a matter of time before TCP/IP software is available. The additional chapter explains the terminology and explores basic issues. When the software is available, readers will be ready to make use of it. As well, graphics used throughout the book have been updated and revised.

The Internet for Commodore C64/128 Users is available in the United States from LoadStar, and can also be purchased directly from VideoCam Services. For more information, contact:

VideoCam Services
90 Hilliers Rd
Reynella, SA 5161
Australia
Phone: +61 (08) 8322-2716
FAX: +61 (08) 8387-5810
Email: videocam@videocam.net.au
Web: http://videocam.net.au

GEOS 128 Patch for SuperCPU

Part of the patch required to use GEOS 128 at 20 MHz with a CMD SuperCPU has been completed. The portion which is currently finished is the new SuperInstall application, which patches GEOS 64 and GEOS 128 for 20 MHz operation, and also creates SuperCPU-compatible mouse drivers for the Commodore 1351 and CMD SmartMouse. Still under development is the GEOS 128 version of CONFIGURE that would provide the ability to use the SuperCPU's optional SuperRAM expansion RAM as a GEOS RAM disk. No date has been given for completion of this portion of the project.

Since only a portion of the GEOS patches are complete at this time, CMD will not yet be shipping this to SuperCPU 128 customers. However, the patch will be made available shortly for free downloading from CMD's web site (http://www.cmdweb.com/), and original purchasers of the SuperCPU 128 may also obtain the currently completed portion by mailing a request to CMD along with $3.00 to cover the cost of providing the patch on disk.

CMD will still mail the full version of the GEOS 128 patches for the SuperCPU, once complete, to all original SuperCPU 128 purchasers.

SWRAP Commodore Show A Success

Lansing IL was the recent site of a Commdore show hosted by the Chicago-based SWRAP Users Group. Several demonstrations were given, with Maurice Randall showing his almost completed version of Wheels 128, an updater for GEOS 128 that provides extended capabilities and compatibility with CMD products. Dale Sidebottom demonstrated color postscrpt printing from GEOS. Jim Butterfield was on-hand, and provided a dissertation on the beginnings of the 6502 and Commodore's entry into the computer market. We'll have a complete run-down of the event in the next issue of Commodore World.

LoadStar Revamps Web Site

LoadStar has recently undergone a major revision to their web site (http://www.loadstar.com), and plans to begin incorporating the complete text of all back issues of their popular disk-based Commodore publication on the site in searchable format. LoadStar luminary Jeff Jones has commented that they intend to turn the LoadStar web site into "the largest Commodore Knowledge base online."

VideoCam Services Adds Web Hosting Services

Following the successful release of The Internet for Commodore C64/128 Users, 3rd edition, VideoCam Services has embarked on a new avenue of Internet support, offering full and virtual web hosting, as well as web design services. Owned by Rod and Gaelyne Gasson, VideoCam Services went online connected to the main Internet backbone on 3 July 1998 and has been striving towards developing a small but thriving Internet presence. Gaelyne is the author of the aforementioned Commodore Internet manual and Web administrator for the company. Rod is the author of QWKRR128, an offline mail reader and Browser (a disk directory program for the C128) and is the system administrator. In the future, VideoCam Services hopes to offer continued online Commodore support including UNIX shell accounts available through telnet. For further information, contact:

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Reynella SA 5161
Australia
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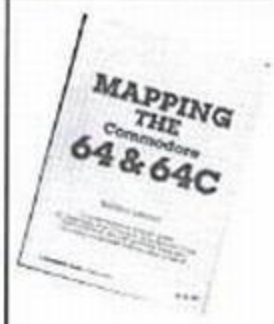

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You should have GEOS 2.0, a large capacity drive (such as a 1581, RAMLink, or CMD HardDrive), and a PostScript laser printer.

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Just For Starters

by Jason Compton

A SIMPLE GUIDE TO UNDERSTANDING PRINTERS

If you want to get anything of value out of your computer, it's generally agreed that you absolutely need some sort of display device, unless you enjoy a mystery. A TV or monitor generally fits the bill. Then, of course, some sort of storage is nice to have—a tape drive will serve, but a floppy drive is better, with hard drives and RAM drives convenient elaborations on the theme. Even with that array, a computer is still limited to the electronic world. Printers fill that void nicely, and of course your Commodore is quite capable of handling a wide variety of printers, from classic models right up to present day creations. Getting started can be a little tricky if you've never tried to turn your computer into your own private press. Just For Starters to the rescue!

Printer Types: Quick Review

In the beginning, there were two basic types of consumer printers. The *daisy wheel* printer is probably the most basic. In effect, it's a glorified typewriter. Characters are put on paper by being stamped through a ribbon by a metal disc with letters stamped into it—the principle on which many electric typewriters work.

Then there were the *dot matrix* printers. A dot matrix printer has a small print head that contains "pins" or "wires" that are programmed by your computer and printer to strike the ribbon and, using the dots, form letters and graphics. They have the distinct advantage over daisy wheel printers in that many can support different types of print and, sometimes using multiple print passes over a single line, create graphics in good detail. They tend to suffer speed and noise problems, but towards the end of the dot matrix printer popularity, some very nice, fast, relatively quiet models were created. The two major categories are 9- and 24-pin dot matrix printers, reflecting the density of the pins and by extension the quality of the output. 24-pin dot matrix printers are often capable of what is called "NLQ" (Near Letter Quality) output, which competes favorably with a good typewriter or higher-end printer product.

Daisy wheel and dot matrix printers tend to use fanfold paper (continuous streams with tractor feed holes on the sides and perforations between each page.) Some will accept plain letter paper and/or envelopes, however.

Inkjet printers forego the metal implements and the cloth ribbons of daisy wheel and dot matrix printers. Instead, the printer shoots a thin stream of ink onto a sheet of letter paper. Inkjets enjoy good quality, good speed, lots of flexibility and generally quiet operation. One of the primary complaints about them is that the ink can smudge quite easily, often when exposed only to the barest amounts of moisture, like the oil from a finger. (one printer manufacturer uses "Bubblejet" as a trademark, but it's the same thing)

Finally, *laser* printers take a different approach—the laser doesn't burn the image onto the page, but it does electrically charge the paper where the output is supposed to appear. Then the page is actually passed through a bath of ink, which only sticks to the areas that have been charged by the laser! Laser printers vary wildly in quality—at their best, they're fast, beautiful, and expensive, while low end models can be quite slow and unreliable.

There are other breeds of printers, like plotters and thermal printers, but they make up a small niche segment of the market.

Now that you know what's available, you have to get it hooked up. Would you believe there's a few different flavors of printer connection, too?

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Hello, Printer

Most Commodore users probably have their printers on the serial bus—the same chain as floppy drives. Commodore-built printers (as well as third-party models created expressly for Commodore computers) almost all have the same round serial bus connector that your computer and floppy drives have. In this case, connecting your printer to your computer is as simple as plugging the printer into a spare serial port, probably found on your last floppy drive. That's a perfectly good place for it.

However, most printers in the world at large are not designed specifically for the Commodore. They conform to a different interface standard, called the Centronics or "parallel" interface. These printers have a D-shaped, "open mouthed" interface, often with two little triangular clips on the narrow sides. Fortunately, there were plenty of interfaces to bridge this gap. Although they varied in form and appearance, each had a plug which connected with the printer's Centronics port, and a cable that ran to the serial bus on the Commodore. Many also had another connector to draw power from the computer's cassette port or joystick port. The Super Graphix and Super Graphix Jr. were among the better products in this category. With a Centronics interface such as these, virtually any printer can be made to serve on a Commodore system, in just about any application that offers printing.

If a Centronics-to-serial-bus interface is not available, another option is the geoCable. The geoCable connects a Centronics printer to the user port—not the serial bus—and comes with a set of custom GEOS printer drivers. In this case, unless you get lucky or take up printer programming you will largely be limited to printing from GEOS applications, but the good news is that the geoCable printer interface and drivers are generally much faster than relying on the serial bus for output.

Finally, you have to know how your printer expects to be addressed. In much the same way as the first floppy drive is device 8, a printer typically lives on device 4. Some Commodore-compatible printers provide switches that allow you to toggle to a different device number (typically 5, although 6 and 7 are offered by some printers and interface combinations), in case you want multiple printers on your system or have some other sort of conflict. If you're dabbling in BASIC, you might be interested to know that you can PRINT to a printer just as you can to the screen. Even if you're not a BASIC dabbler, knowing this makes for a wonderful quick "are you there?" test for your printer.

Before you delve into your favorite publishing or art program with a new printer, you might want to feel reasonably certain that the printer is active and ready for work. A quick way to get a short bit of satisfaction from the printer goes like so in BASIC—just type the lines directly in, hitting the RETURN key after each.

```
OPEN 4,4,0
PRINT#4,"ARE YOU THERE?"
CLOSE 4
```

This example assumes your printer is on device 4. If you are sure it is not, substitute 5 or the device number of the printer for each "4". With luck, your printer will merrily spit out "ARE YOU THERE?"

If It's Working...

If you get a heartbeat from your printer, congratulations! You're well on your way. Now, a few more details to get straight on printer operation.

First of all, there are an awful lot of printer models out there, from dozens of different manufacturers. And while each printer is unique in its own little ways (and most manufacturers introduce specific unique features into all of their products), when it comes right down to it there are common, accepted standards for basic printer operation. So even if you don't recognize a printer model and can't find a listing for it in your programs and documentation, all is probably not lost.

If a printer is Commodore compatible (plugs directly into the serial bus), odds are that will work acceptably well with Commodore printer settings, such as for the MPS line.

If a printer is not Commodore-compatible (is plugged in through some sort of Centronics interface), then odds are extremely good that it is compatible with either a basic IBM or Epson printer model (or both). If you see support for a basic Epson printer, such as Epson FX-80, your printer will likely work just fine with those settings if you cannot find a better match.

Often, the choice of printer compatibility, as well as a number of other details, are configured through DIP switches located somewhere on the printer, usually behind a small panel. These switches are defined in printer manuals and can control default print position, page length, compatibility, and default font—the typeface the printer will use when text like our "ARE YOU THERE?" is sent directly into the printer.

This is a good time to mention that when printers put out text, there may be one of two very different things going on. When you PRINT#4 or use certain types of text editors and word processors, such as SpeedScript, the data is sent to the printer as more or less text only. It is the printer's job to turn the computer text into letters, and it relies on a built-in character set to do this. Some printers, like old Commodore models, have only one character set built in. Newer printers sometimes have a half dozen or more that can be selected through DIP switches or software.

On the other hand, a program like geoWrite that uses different sorts of fonts and graphical layout does not actually send text characters to the printer. It would not send "ARE YOU THERE?" as a stream of 14 characters. Instead, it would send graphical data that appears to the eye to say "ARE YOU THERE?", and the printer then puts that graphic on paper. The

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difference can often be seen in higher quality and in longer print times—because documents that print in this manner are actually just big graphics! You may want to experiment with your printer's built-in fonts to discover what software you really want to use—to decide what you want your results to look like.

If There's Trouble...

If you've got some trouble with your printer, it's important to discover the source. Most printers have built-in test modes that do not require a computer to work. Usually they involve setting a switch or holding down a few buttons when you turn the printer on, and they will race off to prove that they still function. If a printer passes its self-test but won't print for you, there may be a connection problem (make sure everything is plugged in properly), a device number problem (see if your interface may be using a different number), or a software problem (try using different printer settings in your program).

If the problem revolves around paper, the first thing to remember is not to panic. In cases of paper jams or misfeeds, it's usually relatively easy to fix, but the last thing you want to do is to tear the paper to shreds in an attempt to get it out. Tractor feed paper unfortunately can snag very easily if it is not fed very directly into the printer—it's usually best to give tractor feed paper and the printer a wide berth so the paper cannot snag on anything on its way into the printer. Similarly, make sure if you're printing a long document that the OUTGOING paper has a lot of clearance, otherwise the sheets may bunch up inside the printer and cause even more heartache.

Many inkjet printers take paper fed in through a stack in the top. If your paper is feeding unevenly, or several pages are being sucked in at a time, try fanning the paper thoroughly before placing it in the feed tray. This usually relieves jamming problems.

Also remember that most any printer has some built-in method of encouraging paper to move through the system. On dot matrix printers, there is almost always a hand knob. On inkjet, laser, and many dot matrix printers, there are buttons for "line feed" (to move the paper up one line) and "form feed" (to move through an entire sheet of paper). Try using these to clear up the difficulty. And remember to check the "online" button if your printer has one—a printer must usually be offline if you use the paper feed buttons or make other settings changes, but it must be ONLINE when you want to print.

Finally, of course, you may be out of ink. For most recent printers, this is not a problem—ink cartridges are quite readily available. Some aging dot matrix printers don't enjoy the same fate, however. One route is re-inking. In a pinch, WD-40 can be employed sparingly on the ribbon cloth to get dried-up sections of ribbon flowing again, but in the long term it is best to investigate other options. Small office supply and typewriter repair shops can be quite helpful, both for replacement ribbons (it's amazing what these stores stock) and for reinking services. A conversation on this topic online recently net the information a company known as V-Tech (215-362-3300) may be able to help. And, of course, there's always the Commodore dealers listed in this magazine and elsewhere, always a good resource.

Without a working printer, your computer is something of a closed book. Hopefully, this column has been able to get you a step closer to opening it up!

Jason Compton is a freelance writer and Editor of Amiga Report, the online news resource for Commodore Amiga users. Jason can be contacted via Email at jason@cmdweb.com.

Printer Supply Sources

There are a number of common sources that carry printer ribbons and other supplies. For example, local office supply stores often stock a wide variety of printer supplies. Here are some of the more common mail-order sources for ribbons:

MEI/Micro Center
1100 Steelwood Road
Columbus, OH 43212
1-800-634-3478

Midwestern Diskette
508 W. Taylor
Creston IL 50801
1-800-221-6332

Looking for those hard-to-find ribbons for a Commodore MPS model printer? Here's a new source that we recently ran across:

ALL RIBBONS EXPRESS, INC.
6409 Abercorn St., Suite D-1
Savannah GA 31405
1-912-353-6070
ARESAV@aol.com

Here are some order numbers and prices:

MPS-801: #11430 (fab. cart.) $4.25 ea.
MPS-802: #11540 (fab. cart.) $6.55 ea., #11134MS (multi-strike) $7.64 ea.
MPS-803: #11361 (fab. cart.) $4.70 ea.

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Web.It

The New Commodore 64?

by Doug Cotton

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Web.it is the first new computer to ship with a built-in Commodore 64 emulator.

It was mid-August when I received a phone call from an editor at WIRED magazine asking me about the new "Commodore 64". After assuring the caller that it was news to me, I began combing the internet for references—but turned up nothing.

The following day brought a second call, this time from different WIRED employee working the story. This time I asked for sources, which led me to www.webcomputers.net. Here I found what was creating all the ruckus, the new Web.It computer from Web Computers International.

Brief stories appeared on WIRED.COM and ZDNet within a couple of days, and the comp.sys.cbm newsgroup began to come alive with messages about the new product. Other than general specifications, WCI wasn't releasing information until the official European product launch on August 26. Details about the new system were hard to come by, still, opinions were plentiful. With the European release now past, and an upcoming distribution in North America set for just before Christmas, Commodore World has collected the facts to present Commodore users with the most up-to-date information on this new development.

What Is Web.it?

Before we go too much further, we need to define just what Web.it is. Designed in the spirit that propelled the Commodore 64 to the forefront of home computing in the early 80s, Web.it is a low-cost computer that easily attaches to a standard television set. The operating system and common applications are based in ROM (Read-Only Memory), providing near instant startup of the computer and programs.

The operating system software built into Web.it includes PC-DOS 7 and Windows 3.1. This is complemented by a suite of applications which includes Lotus AmiPro wordprocessor, Lotus 123 spreadsheet, Lotus Organiser and Netscape Navigator.

Looking somewhat like an Apple Powerbook, the hardware built into the Web.it includes a built-in 56K (K56Flex/v.90) modem, a 3.5-inch high density disk drive, an 86-key keyboard, a touch-pad/pen controller, a VGA/SVGA graphics chip with television and monitor outputs, and a 16-bit stereo FM (Frequency Modulated) sound chip. Ports include a PC-Card port (2 Type II cards or 1 Type III card), a serial RS-232 port, a Parallel port (printer), a Game port (MIDI/Joystick control), audio Line In/Line Out/Microphone In, and an infrared tranceiver (for IR keyboards and devices).

With 16 MB of RAM, 16 MB of ROM, 2 MB of Flash memory, Web.it is powered by an AMD ELAN SC40566-100 MHz microcontroller, the core of which is basically a 100 MHz clone of the Intel 80486 processor.

Commodore Ties

In addition to the other built-in software, Web.it contains a built-in Commodore 64 emulator (CCS64), which WCI states will support connection of a Commodore floppy drive (presumeably via an x1541-type cable). The inclusion of this emulator has been 'legalized' by licensing the Commodore 64 from Tulip Computer's Commodore division. For those of you who don't have your game card updated, Tulip Computer is a computer firm based in the Netherlands that purchased Commodore, NL (also in the Netherlands) which was spun-off from Germany's Escom Computer. Escom had previously obtained the Commodore and Amiga rights from CBM, but sold the Amiga rights to Gateway 2000 when financial troubles struck.

A number of employees from Tulip's Commodore, NL division—some of whom had worked for divisions of CBM—recognized the need for a simple low-cost (Commodore 64-like) computer in the market. However, with Tulip showing signs of financial problems, the new Web Computers International firm was formed as a vehicle to create the new machine. The culmination of this effort is Web.it.

Web.it For Commodore Users?

With technical specifications and corporate manuevers out of the way, we come now to the all-important question: Is Web.it of any interest to present Commodore 64/128 owners?

The answer to that question has more to do with what else you do or don't own, your budget, and your expectations. Clearly Web.it was designed for users on a low budget, and for parents looking to spend less than the going rate on a computer for their children. Without even considering the built-in C-64 emulation, Web.it is a reasonably well-powered unit for connecting to the Internet, offering a lot more functionality than standard web appliances like WebTV. The built-in word processing and other applications could prove quite valuable to users on a budget.

Web.it boots quickly from ROM, and is also expandable, since device drivers can be loaded into the Flash memory. However, if you want to play the latest CD-ROM game software, you'll need a full-powered state-of-the-art wallet-killing Pentium PC instead of a Web.it.

For Commodore 64 compatibility, you'll need to attach a 1541 drive to access your Commodore software library. Like many emulators, you'll find the keyboard layout and markings don't match what you're used to, and a number of programs simply won't work under emulation. Still, BASIC is there, many programs do work, and the machine offers the ability to get directly on the Internet without having to locate a shell account provider and learn Unix commands. Furthermore, you can browse the Web graphically, a feature not likely to come quickly to the unexpanded Commodore 64 or 128. We're not fanatical about Windows-based PC's, but Web.it has a reasonably-well defined target market that could benefit from its features.

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CMD FD Internals

A PROGRAMMER'S INSIGHT TO THE STORAGE LAYOUT OF CMD FD DISKS

by Doug Cotton

Anyone familiar with the CMD FD Series disk drives (the FD-2000 and FD-4000) is probably also aware that these drives come with the ability to be divided up into partitions. A number of programmers have recently shown interest in the physical layout of disks that have been formatted and partitioned by CMD FD Series drives. This information could be useful in creating a wide variety of programs for the FD drives, including whole disk copiers, disk image utilities, defragmentation programs, disk repair utilities, and even alternate partitioning programs. The information provided in this article should prove to be beneficial to programmers attempting these or other similar projects with the FD Series drives, and we hope that perhaps it may even entice other programmers into looking into the possibilities of creating some these suggested applications.

Quick Overview

In understanding partitioning on the CMD FD Series drives we'll be looking mainly at two system resources stored on each FD disk that carries a CMD style format: the Hardware Block and the Partition Directory. But before we discuss these topics directly, we first need to understand some general terms that describe the way data is organized on a disk.

Disk Anatomy 101

Tracks, Sectors, Sides, and Blocks are all terms that you'll need to understand in order to grasp the information in this article. In addition, there are variations on these terms with regard to Physical, Logical or System coordinates. We'll begin by looking at the physical attributes of a disk and the terms that apply to it.

When storing data to disk, the disk rotates much like an analog record does in a record player. But instead of having one long spiraling groove in which data is stored, a disk's storage is broken down into discrete segments that would more closely resemble rings. These rings are referred to as Tracks. Specifically, we refer to these as Physical Tracks, since these tracks are the ones into which the physical media itself is divided. While this distinction may not seem important now, you'll see that it is very important when we discuss other types of tracks later on.

Since each track can generally store a lot of data, Physical Tracks are further segmented into Physical Sectors to provide a more efficient use of storage space. The data written is generally referred to as a Data Block.

Data is typically stored on both sides of modern disks. Instead of creating additional track numbers to address the second side of the disk, a Physical Side parameter is used. Thus, with double-sided media, locating a specific Data Block requires knowing the Physical Track, Physical Sector and the Physical Side.

This information illustrates the difference between a block and a sector; while the two terms may seem to be used interchangeably, this is not actually the case. A block is a single grouping of data, while a sector is simply one of the parameters that points to where that block of data resides.

Physical Blocks

The number of Physical Sectors per Physical Track (as well as the size of each Physical Block) varies according to the media format. The only constants with the CMD FD formatted disks are that there are always 80 Physical Tracks having two Physical Sides per track. The table below provides the specifics for each format type used by CMD FD Series drives.

FORMAT	TRACKS	SECTORS/TRACK/SIDE	SECTOR SIZE
DD	80 (0-79, $00-$4F)	10 (1-10, $01-$0A)	512 bytes (0-511, $0000-$01FF)
HD	80 (0-79, $00-$4F)	10 (1-10, $01-$0A)	1024 bytes (0-1023, $0000-$03FF)
ED	80 (0-79, $00-$4F)	20 (1-20, $01-$0A)	1024 bytes (0-1023, $0000-$03FF)

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System Blocks

The Hardware Block and the Partition Directory both express media size and partition locations in System Blocks. System Blocks are 512 bytes each in size—regardless of the Physical Sector size used on the media involved. This makes it possible to maintain a consistant means of partition mapping over differing media types.

System Blocks are numbered sequentially beginning with Block 0, which is located at the start of (Physical) Track 0, Sector 1, Side 0. The number progression continues through all remaining sectors on Side 0 of Track 0, then through all sectors on Side 1 of Track 0, then through all sectors on Side 0 of Track 1, etc., until finally reaching the last sector on Side 1 of Track 79.

Logical Blocks

In keeping with Commodore standards, the Logical Block size used by the DOS is 256 bytes, regardless of partition type or physical block size of the medium. As with standard Commodore disk drives, Logical Block locations within a given partition are expressed in Logical Track and Sector format.

To determine where a particular Logical Track and Sector of a given partition is physically located, the Logical Track and Sector are first converted into a Logical Block value. This is done by creating a sum of the Logical Blocks for all tracks below the target location, and then adding the Logical Sector of the target location to that sum. The Logical Block value is then divided by two to convert it into a System Block value; if there is a remainder from this division a flag is set to indicate this. The System Block value is then added to the offset for the start of the target partition (obtained from the Partition Directory). The resulting System Block number and flag value can then be used to calculate the Physical locatation using the physical parameters for the specific type of media format involved.

To illustrate this, let's work out an example. Assume you have an FD-formatted high-density disk containing two 1581 partitions, and you wish to find the physical location of the first directory block (Logical Track 40, Sector 3) of the second 1581 partition.

Step 1: Computer Logical Block Value. The 1581 partition (like the 1581 itself) has 40 Logical Sectors per track. There are 39 complete tracks before Track 40, so we need to multiply 39*40 to get 1560, then add 3 (for Sector 3 on Track 40) to get a Logical Block value of 1563.

Step 2: Convert to System Block Value. To convert to System Blocks we divide the Logical Block value by two and get 781.5. Round this down to 781, but bear in mind that this remainder indicates that we'll need to add 256 bytes to our final result.

Step 3: Add in the Start of Partition Offset. The second partition has a starting System Block address of 1600 ($000640), so if we add this offset to our value we come up with a System Block value of 2381 (plus a remainder).

Step 4: Convert to Media Block Size. An FD-formatted high-density disk has ten 1024-byte sectors per track/side, or 20 sectors per track with both sides included. To make our calculations easier, let's divide our System Block value of 2481 by two to come up with an equivalent 1024-byte value. The result of this is 1190.5, or 1190 plus a remainder. By the way, we now have two remainders to track—this latter one which is a 512-byte offset, plus the earlier 256-byte offset.

Step 5: Find the Physical Location. We can now divide our adjusted System Block value by 20, giving a result of 59.5, or 59 plus a remainder. Since Physical Track numbering begins at 0 instead of 1, this places us at the start of Track 59, Sector 1, Side 0. This latest remainder indicates that we need to add 10 sectors, placing us at the start of Track 59, Sector 1, Side 1. Finally, adding our previous two remainders gives us an offset of (512+256) 768 bytes into the Physical Sector. Thus, beginning at Physical Track 59, Sector 1, Side 0, Byte 768 we'll find the 256 bytes that make up the first directory block of the second 1581 partition. Whew! And now that we know how to calculate where everything is, let's look at where we get some of the parameters.

The System Partition

Every CMD device utilizes a System Partition to store information about devices partitions. On the FD Series disk drives, each individual CMD formatted disk contains a System Partition comprised of two basic areas: the Hardware Block and the Partition Directory. This System Partition is located on Physical Track 80 ($50). Most operating systems do not format disks beyond Physical track 79, yet all drives will format and use this extra track reliably. Using this extra track for system information allows the FD to maintain a full standard area for actual data.

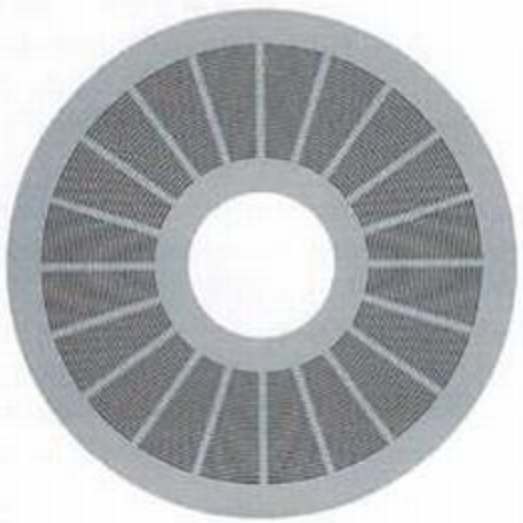
The Hardware Block

The Hardware Block on the FD Series disk drives is a 256-byte segment which contains device type and size information, broken up into four tables. This information is somewhat ambiguous, since there are other methods to determine the media format type, and once that is known, the size is also known. However, these tables maintain cross-compatibility between the FD and other CMD DOS devices like RAMLink and the HD Series hard drives. The location of the Hardware Block is determined by the media format, as provided in the table that follows. Note that the locations given are the Physical Block locations, and the OFFSET shows the address within the Physical Block where the Hardware Block data begins.

FORMAT	TRACK	SECTOR	SIDE	OFFSET
DD	$50	$03	$00	$0100
HD	$50	$02	$00	$0100
ED	$50	$02	$00	$0300

Below you'll find a sample dump of a Hardware Block from a Double Density (DD) disk formatted on an FD Series drive. Note the four tables: DEVICE TYPE, DEVICE ADDRESS HIGH, DEVICE ADDRESS MID, and DEVICE ADDRESS LOW. With any FD Series drive, only

Physical Layout of a Disk



Data is written to disks in concentric rings called *tracks*. Each of the 'circles' on the disk diagram to the left is a track. Tracks are further broken down into more efficient storage areas called *sectors*. A single *data block* is read from or written to a specific track and sector location, also referred to as a *track and sector address*.

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one device (disk mechanism) will be indicated in the device table (value of 00 at Byte $0000). The FF at $0001 indicates that we have reached the end of the devices listed in the table, and the remainder of the table entries are also filled with FF.

The three remaining tables provide the starting address of the devices listed in the Device Type table, using a high-mid-low System Block address. Since the first byte of each of these tables contain a 00, we know that the starting address of the device is $000000. Since only one device exists, the next byte of each table provides us with the System address where the next device to be added would start (if that were actually possible). In the case of the FD, this entry actually shows us the size of the inserted disk, in 512-byte System Blocks ($000640). Converting to decimal, this means there are 1600 System Blocks, which equals 3200 Commodore logical blocks (multiply System Blocks by two to get Commodore blocks). As noted earlier, this sample dump is from a Double-Density (DD) formatted disk; a High-Density (HD) disk would provide 6400 Commodore logical blocks, while an Enhanced-Density (ED) disk (FD-4000 only) would provide 12,800 Commodore logical blocks.

Partition Directory

This Partition Directory is a 1024-byte (1K) structure which contains relevant information on all partitions available on the disk. The Physical location of the Partition Directory varies according to the media format. The table below provides the locations where the Partition Directory can be found. Note that the structure is spread over two Physical Blocks on Double-Density (DD) formatted disks since the Physical Block size on this format is only 512 bytes.

FORMAT	TRACK	SECTOR	SIDE	OFFSET
DD	$50	$05	$00	$0000
	$50	$06	$00	$0000
HD	$50	$03	$00	$0000
ED	$50	$03	$00	$0000

The Partition Directory is made up of 32 entries, one for each possible partition number available on an FD formatted disk. Each entry is 32 bytes and ordered in sequence by partition number (beginning with Partition 0, the System Partition). The entry for the System Partition in the table (Partition 0) is somewhat bogus... it doesn't contain all the information normally found in a Partition Directory entry, providing only the partition type and name only (for the purpose of listing with the $=P directory listing option). Here is the breakdown of the elements that make up a standard Partition Directory entry:

BYTES	DESCRIPTION
$00-01	Logical Track & Sector pointer to next Commodore logical block of structure. Used only when the System Partition is accessed like a standard partition (using a special variation of the FD DOS Change Partition command).
$02	Partition Type: $01 = CMD Native Format $02 = 1541 Emulation $03 = 1571 Emulation $04 = 1581 Emulation $FF = System Partition
$03-04	Reserved
$05-14	Partition Name padded with $A0 bytes
$15	High Byte of Partition Starting Block (in System Blocks)
$16	Middle Byte of Partition Starting Block (in System Blocks)
$17	Low Byte of Partition Starting Block (in System Blocks)
$18-1C	Reserved
$1D	High Byte of Partition Size (in System Blocks)
$1E	Middle Byte of Partition Size (in System Blocks)
$1F	Low Byte of Partition Size (in System Blocks)

Sample Hardware Block

```
$0000  00 FF FF FF FF FF FF FF ........ DEVICE TYPE TABLE
$0008  FF FF FF FF FF FF FF FF ........       00 = FD
$0010  FF FF FF FF FF FF FF FF ........       FF = END OF DEVICES
$0018  FF FF FF FF FF FF FF FF ........
$0020  FF FF FF FF FF FF FF FF ........
$0028  FF FF FF FF FF FF FF FF ........
$0030  FF FF FF FF FF FF FF FF ........
$0038  00 00 FF FF FF FF FF FF ........ DEVICE ADDRESS HIGH TABLE
$0040  FF FF FF FF FF FF FF FF ........
$0048  FF FF FF FF FF FF FF FF ........
$0050  FF FF FF FF FF FF FF FF ........
$0058  FF FF FF FF FF FF FF FF ........
$0060  FF FF FF FF FF FF FF FF ........
$0068  FF FF FF FF FF FF FF FF ........
$0070  00 06 FF FF FF FF FF FF ........ DEVICE ADDRESS MID TABLE
$0078  FF FF FF FF FF FF FF FF ........
$0080  FF FF FF FF FF FF FF FF ........
$0088  FF FF FF FF FF FF FF FF ........
$0090  FF FF FF FF FF FF FF FF ........
$0098  FF FF FF FF FF FF FF FF ........
$00A0  FF FF FF FF FF FF FF FF ........
$00A8  00 40 FF FF FF FF FF FF ........ DEVICE ADDRESS LOW TABLE
$00B0  FF FF FF FF FF FF FF FF ........
$00B8  FF FF FF FF FF FF FF FF ........
$00C0  FF FF FF FF FF FF FF FF ........
$00C8  FF FF FF FF FF FF FF FF ........
$00D0  FF FF FF FF FF FF FF FF ........
$00D8  FF FF FF FF FF FF FF FF ........
$00E0  00 00 01 01 00 00 00 00 ........ DEVICE HEADER
$00E8  00 00 00 00 00 00 00 00 ........
$00F0  43 4D 44 20 46 44 20 53 CMD FD S
$00F8  45 52 49 45 53 20 20 20 ERIES
```

Programming

While we have laid out much of the reference information locating where specific data is physically stored on the FD Series drives, some of you may be wondering what kind of programming is necessary to access the data.

The most accessible method would be to use job queue commands. The FD Series drives provide job codes for transferring a physical block to Buffer 0 at $0300 (Job $A4), write this buffer to a Physical block (Job $A6), read multiple Physical blocks to a specified address range (Job $FC) and write data from a specified address range to multiple Physical blocks (Job $FE). You'll find additional information on the requirements and paramters for these commands under the *Job Queue Instructions* heading in the *Command Reference* section of the *CMD FD User's Manual.*

One last note before you get started—whenever a new disk is inserted, and more importantly, after you have changed partition table data on an FD formatted disk, you should issue the FD DOS "UJP" command. This is an undocumented command that causes the drive to reset and re-read the partition data from the current disk. If you don't do this, the drive often end up using incorrect information stored in variables when trying to access partitions and directories, and may even lock up as a result of incorrectly interpreted data.

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Sample Partition Directory

```
$0000 01 01 FF 00 00 53 59 53 .....SYS
$0008 54 45 4D A0 A0 A0 A0 A0 TEM.....
$0010 A0 A0 A0 A0 A0 00 00 00 ........
$0018 00 00 00 00 00 00 00 00 ........
$0020 00 00 02 00 00 50 41 52 .....PAR
$0028 54 49 54 49 4F 4E 20 31 TITION 1
$0030 20 31 35 34 31 00 00 00  1541...
$0038 00 00 00 00 00 00 01 56 ........
$0040 00 00 03 00 00 50 41 52 .....PAR
$0048 54 49 54 49 4F 4E 20 32 TITION 2
$0050 20 31 35 37 31 00 01 56  1571...
$0058 00 00 00 00 00 00 02 AC ........
$0060 00 00 04 00 00 50 41 52 .....PAR
$0068 54 49 54 49 4F 4E 20 33 TITION 3
$0070 20 31 35 38 31 00 04 02  1581...
$0078 00 00 00 00 00 00 06 40 .......@
$0080 00 00 00 00 00 00 00 00 ........
$0088 00 00 00 00 00 00 00 00 ........
$0090 00 00 00 00 00 00 00 00 ........
$0098 00 00 00 00 00 00 00 00 ........
$00A0 00 00 01 00 00 50 41 52 .....PAR
$00A8 54 49 54 49 4F 4E 20 35 TITION 5
$00B0 20 4E 41 54 56 00 0A 42  NATV..B
$00B8 00 00 00 00 00 00 02 00 ........
$00C0 00 00 00 00 00 00 00 00 ........
$00C8 00 00 00 00 00 00 00 00 ........
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SOFTWARE IN REVIEW

Laser Lover's Disk

Laser-Lovers Disk; $25.00 plus s/h; K. Dale Sidebottom, P.O. Box 303, New Albany, IN 47151-0303

A computer is only as good as the software that runs on it. From a users point of view, the software running on your computer is of paramount importance. Finding something that does what you want in a friendly manner makes using the computer enjoyable. Once you start producing material for others to read your choice of software must not only be based on functionality and ease of use but also on the quality of printed output.

As Commodore users we started off with the de-facto 60 Dots per Inch (DPI) standard of the 1525 printer. While this was usable it left a lot to be desired from the final output. As time progressed we were able to make use of 80 DPI, 24 pin and the latest ink-jet and color printers as well. Multi-strike printer drivers have been developed to improve output but the trade-off for quality was made in printing time.

For Commodore users wishing to mix text and graphics on a full page, however, there is no better output medium than a PostScript-equipped Laser Printer (of which I have used 300, 600 and 1200 DPI models). PS Lasers provide the necessary quality with no time penalty. I recently published a 20 page User Group Newsletter and it only took 23 minutes to print 220 KB of geoWrite and geoPublish files.

A Need For Change

Desktop Publishing (DTP) was the hottest thing in computing in the mid-'80's and the Apple Macintosh was front and center along with its LaserWriter printer. The cost of this unit was prohibitive, due in part to the licencing fees for Adobe Systems PostScript (PS) Page Description Language. PostScript is a powerful programming language that allows precise placement and handling of all text and graphic elements on a page.

After seeing a demo of geoPublish in the spring of 1988 I started using GEOS. GeoPublish is the only Commodore DTP package that supports PostScript Lasers for the crisp output required of published documents. In November of 1988 I printed my first laser document on a $6000 NEC PostScript Printer and have used many different lasers for important work ever since.

Other than the methods I used to print my files (direct connections, modem transfers, Commodore/Amiga/DOS/Mac disk transfers, Big Blue Reader), and the fact that I finally got my own PS Laser in 1997, nothing has changed in 10 years as far as my output capabilities are concerned. I have been limited to the 11 GEOS Laser (LW) fonts. My text could not be printed upside-down. Graphic manipulation was scant at best. Basically, I got the high-quality output I needed but had no access to the full power of PostScript.

The Catalyst Of Change

With the introduction of Dale Sidebottoms Laser-Lovers Disk my DTP projects will be transformed in ways previously not possible. PostPrint is the new GEOS program on this disk and it allows true

PS program code to be sent to a laser directly from a geoWrite file. PostPrint utilizes either a geoCable parallel connection or a serial interface.

While the centerpiece of this product is the PostPrint program authored by Maurice Randall (Wheels, geoFAX, geoShell), the true value comes from the intellectual property passed on by Dale. When you read the information, after printing it on your Laser, and come to know a little about Dale, it becomes obvious that here is a man who represents the epitome' of the Commodore Community.

Dale spent $1500 on his H.P. Laser in 1991. He paid $195 annual dues for 2 years as the only Commodore member of the Adobe Developers Association, learning all he could about PS programming. He had a need for a program, PostPrint, and got Maurice to write it for him. And now he is passing all of that knowledge and experience on to his fellow C= users.

What Has Changed

After receiving the Laser Lovers Disk my print options have finally changed. No longer will I send my geoPublish files straight to my printer. By printing my PS files to disk with a patched geoPubLaser (a process I used extensively in the 9 years before getting my own laser) I can create what Dale calls 'Hybrid' projects. These print jobs combine the code to generate my geoPublish file along with custom code inserted for special effects.

"What kind of effects?" you ask. Well, how about the ability to rotate text or graphics in 1 degree increments to any angle you desire? How about having your text print in a circle? How about adding shadows in front of your text just like the GoDot ads on the back of this magazine? All of these things are possible, plus more, with this disk and a little effort. Examples of many of these tricks are included.

One of the most liberating features of this product is the destruction of the 11 font limit. In a far more commanding display of power than either Mark McGwire or Sammy Sosa displayed at the plate, Dale has converted over 600 Public Domain PS Fonts (from CDs with thousands) to a format that is easily downloaded from a Commodore to a Laser.

More Changes Still Coming

The L.L. disk presently contains one font plus two articles to print out using this font as an example. Dale intends to make this a two-disk set and include more fonts plus information on working with JPEG images and Encapsulated PS files. Plans are also in place to upload some fonts to the Internet.

The vast libraries of PS fonts and graphics from other platforms are now usable by everyone with a Commodore and a Laser. Please note that the price of Lasers is coming down and a lot of older units will come up for sale as higher resolution and color models arrive. If you can't afford a Laser then maybe you can find someone who wouldn't mind letting you connect your 64 to theirs for printing. I have used an SX-64 portable for such 'location prints' with no problems.

If you have ever wanted to enhance the PostScript capabilities of GEOS this disk is a 'must have'. To paraphrase Dale, this disk is for any Commodore user who "cares enough to print their very best".

- Bruce Thomas

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Mailed in orders for non-reserved out-of-stock items will result in a merchandise credit. No cash refunds. All items listed here are sold "as-is", and all sales are final. Prices and specifications subject to change without notice. Not responsible for typographical errors.

BOOKS

Anatomy Of The 1541	$8.00
C128 Computer Aided Design (new)	$8.00
C64 Programmer's Reference Guide	$25.00
Commodore 64 Favorite Programs Explained	$10.00
Guide to Care, Feeding and Training of C-64	$6.00
How To Use The Commodore 64 Computer	$10.00
Merlin 64-The Macro Assembler for the C=64	$10.00
Osborne 1 User's Reference Guide	$15.00
The Elementary Commodore 64	$10.00
The Official Book Of King's Quest	$10.00
The Visible Computer:6502 NO DISK	$10.00
Your Commodore 64-A Guide to the C64	$10.00

BUSINESS

Better Working File & Report (new)	$15.00
Business System Sales Analysis Mngmnt	$10.00
Datamanager 2 (new)	$15.00
Easy Finance 1	$5.00
Easy Finance I	$5.00
Easy Finance II	$5.00
Easy Finance III	$5.00
Easy Finance IV	$5.00
Easy Finance V	$5.00
Filer's Choice-Filing System	$8.00
Paperback Filer 64	$10.00
Paperback Planner 64	$10.00
Planner's Choice -Personal Planning System	$8.00
Power Assembler-(new)	$10.00
Practicalc-(new)	$10.00
Practifile 64-(new)	$10.00
RUN Productivity Pak II	$8.00
Silent Butler (Check Writing system)	$15.00
Silent Butler (new)	$25.00
Superbase 128	$15.00
Swiftcalc 64	$10.00
The Consultant (Database Management)	$15.00
The ELF System (new)	$20.00
The Home Accountant	$15.00
The Home Banker	$10.00
The Home Manager	$10.00
The Manager	$10.00
The Negotiation (new)	$15.00
The Sales Edge (new)	$15.00
The Word Machine/Name Machine (new)	$5.00
Valuecalc	$8.00

CARTRIDGES

Alf in The Color Caves	$10.00
Alpha Build	$10.00
Big Bird's Special Delivery	$10.00
Bubble Burst	$10.00
Compute's Music System w/SID Cart.	$50.00
Easycalc	$8.00
Facemaker-(new)	$10.00
Frogger VIC 20 Version	$10.00
Heskit	$10.00
Hop Along Counting	$10.00
Kids on Keys (new)	$10.00
Kindercomp	$10.00
Linking Logic	$10.00
Mastertype (new)	$10.00
Sea Speller	$10.00
Turtle Graphics II (LOGO-type language)	$8.00
Up & Add 'em	$10.00

CARTRIDGES (No Docs)

Attack of the Mutant Camels	$8.00
Blueprint	$8.00
Clowns	$8.00
Ducks Ahoy	$8.00
Hop Along Counting	$8.00
Kindercomp	$8.00
Linking Logic	$8.00
Magic Desk I	$8.00
Maze Master	$8.00
Memory Manor	$8.00
Number Tumblers	$8.00
Popeye	$8.00
Sea Speller	$8.00
Sea Wolf	$8.00
Speed/Bingo Math	$8.00
Star Post	$8.00
Story Machine	$8.00
Up & Add 'em	$8.00

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Awardware	$8.00
Certificate Maker (new)	$15.00
Delta Drawing (new)	$6.00
Newsmaker 128	$10.00
Print Master	$10.00
Printer's Devil for Print Shop	$8.00
Printmaster Plus 64/128	$15.00
The Newsroom	$10.00
The Newsroom (new)	$15.00

DISK UTILITY

Commodore 64 Software Bonus Pak	$5.00
The Disk Drive Manager	$8.00

EDUCATIONAL/CHILDREN

Alphabet Zoo (new)	$10.00
Chase On Tom Sawyer Island	$10.00
Color Me - The Computer Coloring Kit	$10.00
Computer Science	$5.00
Dancing Bear - for use with Koala Pad (new)	$6.00
Donald's Alphabet Chase	$10.00
Early Learning Friends	$10.00
First Men on the Moon - Math (new)	$6.00
In Search of the Most Amazing Thing (new)	$6.00
Jungle Book Reading (new)	$6.00
Kidwriter-(new)	$6.00
Koalagrams Spelling 1-for Koala Pad (new)	$6.00
Looney Tunes Print Kit	$10.00
MECC Expeditions	$8.00
MECC Odell Lake	$8.00
Paint-A-Rhyme -for use with Koala Pad (new)	$6.00
Peter Rabbit Reading-(new)	$6.00
Snooper Troops Case #1 (new)	$6.00
Snooper Troops Case #2	$5.00
Snooper Troops Case #2 (new)	$6.00
Snoopy's Skywriter Scrambler	$10.00
Spell Diver	$8.00
Stickybear Math	$10.00
Story Machine	$8.00
SUNBURST-Memory Building Blocks	$10.00
SUNBURST-Tiger's Tales Reading Adven	$10.00
Up for Grabs (new)	$6.00
Where in Europe is Carmen Sandiego (new)	$20.00
Where in the USA is Carmen Sandiego	$20.00
Where in the World is CarmenSandiego(new)	$25.00
Wizard of Words	$10.00
Word Attack Ages 9 and up	$10.00

GAMES

Amnesia	$6.00
Archon	$10.00
Ardok-The Barbarian	$6.00
Batman-The Caped Crusader	$10.00
Beach-Head	$6.00
Beach-Head II	$6.00
Below The Root (new)	$10.00
Borrowed Time	$6.00
Bubble Ghost	$6.00
Bureaucracy	$10.00
Championship Baseball	$6.00
Championship Golf (new)	$6.00
Championship Wrestling	$6.00
Chomp (new)	$4.00
Cutthroats (new)	$10.00
Dark Tower-(new)	$6.00
Elite	$15.00
Feud	$6.00
Final Conflict	$6.00
Fist - The Legend Continues	$6.00
Flight Simulator Scenery Disk #5	$10.00
Gauntlet	$6.00
GFL Championship Football	$6.00
Gold Record Race-(new)	$6.00
Grand Prix Circuit-(new)	$10.00
Guerilla (new)	$6.00
Handball (new)	$6.00
Heart of Africa	$6.00
Heartland (new)	$6.00
High Roller	$6.00
Invaders of the Lost Tomb-(new)	$6.00
Jeopardy Jr. Edition	$8.00
John Elway's Quarterback	$6.00
Jordan vs Bird	$10.00
Karate Chop (new)	$6.00
Kings of the Beach (new)	$6.00
Kung Fu II-Sticks of Death (new)	$6.00
Lords of Conquest-(new)	$6.00
Mean Streets	$10.00
Mind Mirror	$6.00
Mini Man	$6.00
Murder by the Dozen	$8.00
Navy Seal	$6.00
Navy Seal (new)	$8.00
Operation Whirlwind	$6.00
Pathwords	$6.00
Penetrator-(new)	$6.00
Predator	$6.00
Presidential Campaign	$6.00
Q-Bopper	$6.00
Qix (new)	$6.00
Raid Over Moscow	$6.00
Railroad Tycoon-(new)	$6.00
Realm of Impossibility	$6.00
Rocket Ranger	$8.00
Sanxion	$6.00
SARGON II	$4.00
Sargon II-(new)	$6.00
Sargon III-(new)	$6.00
Serve and Volley (new)	$6.00
Sky Fox	$6.00
Sporting News Baseball	$6.00
Star Trooper-(new)	$6.00
Star Trooper/Penetrator Bonus Pack (new)	$8.00
Stationfall	$6.00
Superstar Ice Hockey	$6.00
Test Drive	$6.00
The American Challange-Sailing Sim. (new)	$10.00
The President is Missing (new)	$5.00
Total Eclipse (new)	$5.00
Tracker	$6.00
Trinity	$10.00
Ultimate Wizard	$6.00
Word Flyer	$6.00
Zenji	$6.00
Zork II	$10.00

GEOS

GEOBASIC (new)	$10.00

HARDWARE

1520 Printer	$25.00
1526 Printer w/manual	$25.00
1581 Floppy Disk Drive	$99.00
1702 Monitor -Color 40 Column-refurbished	$99.00
1802 Monitor-Color Monitor 40 Col.-refurb	$139.00
Aprotek 1200 Baud Mini-Modem (new)	$30.00
Assorted Joysticks	$5.00
C128D Keyboards (NEW)	$69.95
C128D Keyboards-REFURBISHED	$59.95
C64 Keyboard (NEW)	$49.95
C64 Keyboard (refurbished)	$39.95
C= 1750 Ram Expansion Unit w/manual	$75.00
CPU64 Version 1 Base Model	$139.00
Datasette	$5.00
EPYX Fast Load Cartridge w/Manual	$10.00
G-WIZ Printer Interface	$49.00
G-Wiz Printer Interface w/Manual	$49.00
Grappler CD Printer Interface	$29.00
KXP 1080i Printer	$75.00
KXP 1180 Printer	$75.00
Laser 190E Printer	$30.00
MicroWorld MW-302C Printer Interface	$30.00
Mot. 28.8 Class1 Modem w/Turbo232 & cbl	$99.00
MPS 803 Printer	$25.00
Multiplexer	$50.00
Okidata Microline 182 Turbo Printer	$45.00
Okimate 10 Printer w/manual	$50.00
Okimate 10 Color Printer C=Ready	$79.00
Omnitronix Serial Printer Interface	$25.00
PLUS 4 -Like New w/Manual, no P/S -AS IS	$15.00
R.I.S.T ComTalker 64 Speech Synthesizer	$25.00
Seikosha SP1000VDC Printerw/ Manual	$50.00
Smart One 2400 Modem w/Swiftlink & Cable	$50.00
STAR Gemini 10X w/Manual	$25.00
STAR NX1000C C= Ready	$89.00
Super Grafix Gold Printer Interface w/manual	$69.00
Super Grafix Printer Interface w/manual	$49.00
Used SlimLine cases for Commodore 64	$10.00

MISCELLANEOUS SOFTWARE

Aerobics	$6.00
Bobsterm Pro (new)	$10.00
Commodore Business	$5.00
Commodore Technology	$5.00
Postcards	$10.00
RAMDOS Lightning Fast RAM-Disk	$5.00
The Kitchen Manager	$5.00
Toyshop (new)	$25.00
Warewithall (Mixed Party Paper Pak) (new)	$15.00
Writer/File Pak 1541	$8.00

PROGRAMMING

GEOBASIC (new)	$10.00
Hesware - Graphics Basic	$10.00
Simon's Basic	$10.00

WORD PROCESSING

Easy Working Writer	$10.00
Fleet System For C128	$15.00
Ghost Writer 128	$10.00
Homeword (new)	$6.00
Mastertypes Writer	$8.00
Mirage Concepts-Prof. Word Processor	$10.00
Pocket Writer 128-Version 3.0	$40.00
Pocket Writer 64 -Version 1	$20.00
Pocket Writer 64 -Version 3.0	$40.00
Supertext Word Processor	$10.00
The Printed Word	$8.00
Writers Choice Word Processing	$8.00

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SUPER FD BACKUP

by Doug Cotton

Ever want to make a backup of an FD disk, but find you didn't have another CMD device to copy it to first? Since MCOPY only works with two seperate devices, getting a backup accomplished is often a logistics problem. The program presented here can help, provided you have a SuperCPU with some additional RAM installed. FD Backup will let you use that extra RAM as a buffer, making it possible to copy entire FD disks without a lot of tedious disk-swapping. One caveat: FD Backup doesn't use any custom disk I/O routines, so it isn't as fast as programs like MCOPY. Still, if you don't have anywhere to MCOPY to, FD Backup can be a huge help.

The program listing presented here isn't FD Backup itself, but is instead a program that creates FD Backup when you RUN it. Enter the program using our CheckSum utility (listed elsewhere in this issue) to be sure that you don't have any errors. Save the program as CREATEFDB.BAS when you have finished entering it.

When you RUN this program, it should report that it is "READY TO BUILD FDBACKUP", and will prompt you for a device number for saving the FD Backup program. If everything goes okay, the result will be a program called FDBACKUP on the device you specified.

The FD Backup program can copy CBM (1581) and all CMD (DD/HD/ED) disk formats, and is fairly simple to use. After you LOAD and RUN it, it will search for an FD disk drive on your computer's serial bus. It will also check to make sure you have a SuperCPU with enough extra RAM available. If your hardware doesn't meet these criteria, an error message will inform you that fact. Other than that, simply follow the prompts for inserting the disks at the proper time, and FD Backup will keep you informed of its progress while copying.

√Σ	CREATEFDB.BAS
75	10 print"{CLEAR/HOME}";
231	20 print"ready to build fdbackup":print" save on which device";
239	30 dv$="":inputdv$:ifdv$=""then30
218	40 dv=val(dv$):if dv<8 or dv>29 then goto 10
214	50 open8,dv,8,"fdbackup,p,w"
21	60 read a$:print".";:if a$="end" then close8:goto120
137	70 fori=1tolen(a$)step2
133	80 h=asc(mid$(a$,i,1))-48:ifh>9thenh=h-7:c=c+h
160	90 l=asc(mid$(a$,i+1,1))-48:ifl>9thenl=l-7:c=c+l
81	100 v=l+h*16:print#8,chr$(v);
195	110 next:goto60
221	120 ifc<>23197thenprint"error in data!"
3	130 end
198	140 :
45	1000 data 01080b0800009e32303631000000 4c
204	1010 data 5b080000000000000000000000000000
46	1020 data 00000000000000000000000000000000
56	1030 data 00000000000000000000000000000000
2	1040 data 00000000000000000000000000000000
12	1050 data 00000000000000000000000000000000
2	1060 data 0000a9008d1708adfdffc9ffd0038d
216	1070 data 1708a9008d20d08d21d020ec122070
247	1080 data 1220851ad1e08d019205c10204e4f
8	1090 data 2044455649434553204 64f554e440d
169	1100 data 004c140c20a10fad1008d01b205c10
156	1110 data 204e4f2046442044524956455320 46
120	1120 data 4f554e440d004c140c205c1020494e
63	1130 data 53455254205 34f5552434520444953
69	1140 data 4b20494e2044455649434520 00ad14
183	1150 data 0820390fad4d0820d2ffad4e0820d2
31	1160 data ff205c100d20414e442052052455353
109	1170 data 2052455455524e0d0020e4ffc90dd0
207	1180 data f920ec1220fc0f2c1a08104e205c10
62	1190 data 204449534b204953204d495353494e
250	1200 data 472c20554e464f524d41545445442c
212	1210 data 204f520d2049532041 4e20554e5245

√Σ	CREATEFDB.BAS *(cont.)*
230	1220 data 434f474e495a45442046 4f524d4154
60	1230 data 0d0020ec0bc959d0034cbc084c140c
255	1240 data 20450c2003 0f2c1b0830102 0cf1220
13	1250 data ec0bc959d0034cbc084c140cae1a08
61	1260 data bd250f8d5108bd290f8d5308bd2d0f
204	1270 data 8d5508bd310f8d5708bd350f8d5808
111	1280 data a9fc8d400ea9008de10cad7cd28de2
234	1290 data 0cad7dd28de30c2059112 0ccffa900
224	1300 data 8d5008a9008d5408a9018d5208205e
3	1310 data 0dad3f0ef0034c6d0ba9038d560820
135	1320 data ccff206d1320b30cad3f0ef0034c6d
55	1330 data 0bee5608ad5608cd5708d0e4ad5208
136	1340 data 186d58088d5208ad5208cd5308d0c2
143	1350 data ee5408ad5408cd5508d0b2ee5008ad
142	1360 data 5008cd5108d0a2206a11ad1a088d59
180	1370 data 0820ec12205c1020494e5345525420
109	1380 data 5441524745542044 9534b20494e20
196	1390 data 4445564943452000ad140820390fad
241	1400 data 4d0820d2ffad4e0820d2ff205c100d
56	1410 data 20414e442050524553532052455455
87	1420 data 524e0d0020e4ffc90dd0f920ec1220
170	1430 data fc0fc980f0a1ad59088d1a0820670e
23	1440 data 2041 0ef0262 05c1020 4449534b2045
4	1450 data 52524f523a2000ad4c0820390fad4d
52	1460 data 0820d2ffad4e0820d2ff4c9d0b20c4
200	1470 data 0f20ec1220450cae1a08bd250f8d51
162	1480 data 08bd290f8d5308bd2d0f8d5508bd31
15	1490 data 0f8d5708bd350f8d5808a9fe8d400e
135	1500 data a9008d2a0dad7cd28d2b0dad7dd28d
97	1510 data 2c0d2059112 0ccffa9008d5008a900
138	1520 data 8d5408a9018d5208a9038d560820fe
15	1530 data 0cad3f0ef0034c9d0b20ccff206d13
95	1540 data ee5608ad5608cd5708d0e4205e0dad
208	1550 data 3f0ef0034c9d0bad5208186d58088d
218	1560 data 5208ad5208cd5308d0c2ee5408ad54
209	1570 data 08cd5508d0b2ee5008ad5008cd5108
214	1580 data d0a2206a114ccf0b20ccff206a1120
248	1590 data 5c100d0d0d20534f55524345204449
126	1600 data 534b2049532042414421 0d0020ec0b
232	1610 data c959d00620ec124cbc086020ccff20
228	1620 data 6a11205c100d0d0d20544152474554

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√Σ	CREATEFDB.BAS *(cont.)*
116	1630 data 204449534b2049532042414421 0d00
221	1640 data 20ec0bc959d00620ec124c250a4c14
81	1650 data 0c20ec1220e00f205c1020434f5059
177	1660 data 20434f4d504c45544521 0d004c140c
148	1670 data 205c100d2054525920412044494646
78	1680 data 4552454e54204449534b3f2028592f
175	1690 data 4e290d0020e4fff0fb6020ec12205c
82	1700 data 1020434f505920414e4f5448455220
165	1710 data 4449534b3f2028592f4e290d0020e4
67	1720 data fff0fbc959d00620ec124cbc086020
15	1730 data 5c10204449534b20545950453a2000
191	1740 data ad1a08d0034c980cc901d0034c8a0c
202	1750 data c902d0034c7c0c4c6e0c205c10434d
104	1760 data 4420332e324d0d00602 05c10434d44
77	1770 data 20312e364d0d00602 05c10434d4420
188	1780 data 3830304b0d00602 05c1043424d2031
249	1790 data 3538310d00604e303a434d442c4644
109	1800 data 2c444845a9008d3f0e8df70ead5608
196	1810 data 8df80ea9008df90e20da0ea5904820
1	1820 data ccff68f004ee3f0e60a20f20c6ffa2
162	1830 data 0020cfff9f000000a590f00720ccff
62	1840 data ee3f0e60e8d0eb20ccffeee20cd003
154	1850 data eee30c60a9008d3f0ead2a0d8dd60e
52	1860 data ad56088dd70e207811a200a005bdd3
237	1870 data 0e20d2ffe888d0f6a92020d2ffa200
26	1880 data a020bf0000002 0d2ffa590f006ee3f
8	1890 data 0e4c3e0de888d0eb20ccffad3f0ef0
52	1900 data 0160ad2a0d1869208d2a0dad2a0dd0
227	1910 data a9ee2b0dd003ee2c0d60a9038d5a08
132	1920 data a9008dd60ea9288dd70ead50088dd9
80	1930 data 0e20b90eeed60ead52088dd90e20b9
210	1940 data 0ea9408dd60ea9288dd70ead54088d
66	1950 data d90e20b90ea9808dd60ea9288dd70e
39	1960 data a9008dd90e20b90ea9608dd60ea928
52	1970 data 8dd70ea9038dd90e20b90ea9a08dd6
66	1980 data 0ea9288dd70ead58088dd90e20b90e
93	1990 data a9288dd60ea9008dd70ead400e8dd9
202	2000 data 0e20b90ea9288df70ea9008df80ea9
207	2010 data 018df90e20da0e20ccffa20f20c6ff
201	2020 data 20cfff8d3f0e20ccff2c3f0e30e7ad
132	2030 data 3f0ef032ce5a08d0bb205c10131111
64	2040 data 111111111111204a4f42204552524f
242	2050 data 523a20002039 0fad4d0820d2ffad4e
194	2060 data 0820d2ffa90d20d2ff600000205911
44	2070 data a20f20c6ff20cfff8d4d0820cfff8d
152	2080 data 4e0820cfffa59050f9206a11a9308d
45	2090 data 4c084c630f205c1020464f524d4154
179	2100 data 54494e47204449534b2e2e2e0d0020
36	2110 data 5911207811a200a00abda60c20d2ff
47	2120 data e888d0f6ae1a08f013bdaf0c20d2ff
102	2130 data a94420d2ffa94e20d2ff18900aa938
196	2140 data 20d2ffa93120d2ff206a116020ccff
5	2150 data a20f20c9ffa200a007bdd30e20d2ff
69	2160 data e888d0f620ccff604d2d5700000100
3	2170 data 20ccffa20f20c9ffa200a007bdf40e
203	2180 data 20d2ffe888d0f620ccff604d2d5200
192	2190 data 000100d80a850a00c0c1932a9008d1b
241	2200 data 08ae1a08ad1d08ddff0eb00160d009
10	2210 data ad1c08ddfb0eb00160a9808d1b0860
109	2220 data 50515151 0b0b0b1502020202171717
217	2230 data 170a0a0505a2308e4c088e4d088e4e
93	2240 data 08a000be4c08f01438f9600fe8b0fa
96	2250 data 79600fca488a994c0868c8d0e76064
56	2260 data 0a01ad4c0848a9008d4c086838e930
20	2270 data f00caaa900186964cad0fa8d4c08ad
45	2280 data 4d0838e930f00daaad4c0818690aca
43	2290 data d0fa8d4c08ad4e0838e93018 6d4c08
103	2300 data 8d4c0860a2008e1008bd3508c907d0
235	2310 data 108e13088d1608bd1e088d1408ee10
208	2320 data 0860e8bd1e08d0e360205911207811
88	2330 data a94920d2ffa93020d2ffa93a20d2ff

√Σ	CREATEFDB.BAS *(cont.)*
153	2340 data 20ccff206a1160205911207811a955
210	2350 data 20d2ffa94a20d2ffa95020d2ff20cc
47	2360 data ff206a1160ae1308bd1e0885ba20e0
146	2370 data 0f20c40f205911203212206a112c19
251	2380 data 083005a9004c5010700 5a9014c5010
112	2390 data 18ad19080a0a8d1a082c1a083005a9
45	2400 data 024c5010500 5a9004c5210ad190829
196	2410 data 0fd005a9034c5010c9059004a90409
1	2420 data 80aae004d001ca8e1a0860488a4898
41	2430 data 48a000bafe0401d003fe0501bd0401
13	2440 data 85cebd050185cfb1cef00520d2ff90
151	2450 data e468a868aa6860a016a9008d13088d
91	2460 data 14088d16088d180885ba991e089935
129	2470 data 0888d0f720c610a0ffc88c1308a900
134	2480 data 991e089935 08201f11e01fb00dac13
187	2490 data 089935088a991e08189 0e060a90420
34	2500 data cf103034a90548a9008d1808859068
14	2510 data 20b4ffa96f2093ffa59030 1d200211
138	2520 data 78200d114878200d1124905 0f820ab
189	2530 data ff68c930d005a9808d1808602c1708
135	2540 data 10034ce9e44ccceda90085a52c1708
212	2550 data 10062073e54c45e44c18eeae1408e8
205	2560 data 8e1408e01fb01be008b004a208d0f1
245	2570 data e00ed0052c1808 30e4204c11b0df20
32	2580 data 7d11b0daae1408ad16086086ba2075
32	2590 data 1108206a1128a6ba60a90fa6baa00f
239	2600 data 20baffa90020bdff4cc0ffa90f4820
205	2610 data ccff68184cc3ff205911a20f4cc9ff
203	2620 data 205911a90820f811a203ddf411f005
57	2630 data ca10f8303d8a0a8d16082 0f811ae16
10	2640 data 08f002e8e8dde411f021e004d004ca
149	2650 data cad0f3e000d01da20ec946f00fc952
175	2660 data d013a20aad1508c94cf00ca20cad15
163	2670 data 08dde511f002a2108a4a8d16082 06a
111	2680 data 111860a4fec6e5e9a60000a0fe4844
244	2690 data 34b137b138b13331524c5244464443
54	2700 data 0dff3348207811a903a22fa012205f
118	2710 data 1268aabdda1120d2ffbddb1120d2ff
74	2720 data a90220d2ff20ccffa20f20c6ff20cf
1	2730 data ff4820cfff8d15082 0ccff68604d2d
236	2740 data 52207811a904a25aa0122 05f1220cc
243	2750 data ffa20f20c6ff20cfff20cfff8d1908
39	2760 data 20cfff24905 0f920ccff60472d5000
99	2770 data 0d86fb84fcaaa000b1fb20d2ffc8ca
16	2780 data d0f760a9008d1b082cb9d01018205c
100	2790 data 10205355504552435055205245515 5
28	2800 data 49524544 0d0060ad87e4c932b01fad
173	2810 data 89e4c934b01820 5c1020535550 4552
179	2820 data 52414d2052455155495245440d0060
119	2830 data 18fbc23038ad7ed2ed7cd28d1c0838
6	2840 data fbad1d08c90db01720 5c1020494e53
67	2850 data 554646494349454e542052414d0d00
32	2860 data 60a9808d1b0860205c10931e20c0c0
35	2870 data c0c0c0c0c0c0c0c0c0c0c0c0c0c0c0
25	2880 data c0c0c0c0c0c0c0c0c0c0c0c0c0c0c0
226	2890 data c0c0c0c0c0c00d0520202020202020
157	2900 data 464442414 34b5550205631 2e303020
90	2910 data 2843293139393820434d4420202020
187	2920 data 20200d1e20c0c0c0c0c0c0c0c0c0c0
239	2930 data c0c0c0c0c0c0c0c0c0c0c0c0c0c0c0
237	2940 data c0c0c0c0c0c0c0c0c0c0c0c0c00d00
231	2950 data 60205c10131111111111120 54524143
248	2960 data 4b3a202000ad500820390f20df1320
13	2970 data ec13205c1020534944453a2020 2000
48	2980 data ad540820390f20df1320ec1360205c
15	2990 data 1020424 14e4b3a2020 2000ade30c20
224	3000 data 390f20df1320ec13205c1020504147
128	3010 data 453a2020 2000ade20c20390f20d913
205	3020 data 20ec1360ad4c0820d2ffad4d0820d2
221	3030 data ffad4e0820d2ff60a90d20d2ff60
233	3040 data end

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Graphic Interpretation

by Bruce Thomas

USEFUL GEOS UTILITIES

GEOS users have plenty of utility programs that let them do necessary tasks not available when using only the standard BSW applications. Many times the best way to push the limits of your software is to try things that aren't in the manuals. I use a few programs all the time to do things that I am sure the author never intended.

Thank You, Jim

Now, knowing that Jim Collette wrote CMD Move, geoWizard and MiniDesk immediately puts my mind to rest about not being able to crash my system. His programs are far and away some of the best GEOS programs around (although I wish he had put the background color wash into MiniDesk so that my Icons aren't visible when running it from the DeskTop).

I use MiniDesk to move files from my real drives to my REU and back. I have my FD-2000 disks set up as two 1581 partitions and when I am copying files I often want one or two files from each partition on a disk. It is rather clumsy to run MiniDesk, copy some files, exit, run CMD Move to change partitions, exit, run MiniDesk again, copy some files and then exit to start my work.

MiniDesk and CMD Move both support more than two drives so you don't even have to worry about your configuration. I run MiniDesk and copy the files I want from the first partition. Next, I activate geoWizard with my mouse buttons, press C= L to load a program and choose CMD Move (which is stuffed into my REU during bootup). Now I select the other partition and Quit CMD Move.

A dialog box comes up telling me to insert the first partition 'disk' again. Clicking on CANCEL I am returned to MiniDesk where I choose DISK and the directory of the new Partition comes on screen. I can copy the files I want and exit to my REU only once. Fantastic!

Save Your Work

Another use for MiniDesk involves file updates when working in an REU. I set the Alarm Clock DA for half an hour when I start working. When the chime goes off I reset the alarm for another half an hour, then 'update' my file and activate MiniDesk from the GEOS menu. With it, I copy the file I am working on from my REU to a real disk and exit right back to where I was. I don't have to exit the application or scroll around to find my place again! I keep working until the alarm goes off and then update and save again.

This avoids the agony of losing everything in the event of a power failure, inadvertant 'recover' menu selection (preview and recover are next to each other and it is easy to make a mistake - and everyone makes one now and then), or just plain forgetfulness to save from the REU prior to shutting down.

I have done this in 'Write, 'Paint and 'Publish with no problems but remember,

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"Many times the best way to push the limits of your software is to try things that aren't in the manuals."

this wasn't the way the software was designed to be used so be cautious the first few times you try these procedures.

Make A Note Of It

One other extremely handy utility is the Desk Accessory InfoViewV2 by Douglas Adams (2/15/92) which assures that I will remember what fonts I have used in any particular document. Calling InfoView lets you view and edit the info box of any file on any drive.

Whenever I start a document and choose a new font I go to InfoView, call up the file's info box and add the font name to the notes section. If I start using another font I just add its' name in the same manner. This comes in handy if I want to look at a file again at some later date as I keep all of my files on a separate disk from my applications, fonts and utilities.

InfoView has a very thorough visual interface of the information you are viewing including the drive you are looking at, how many GEOS files it contains, the file Icon and full Info Box. While the default view is all files on the disk you can selectively view the file types you want by clicking on the FILE TYPE box just below the InfoView Title. Keyboard shortcuts and a handy search function (including wildcards) makes finding the file you want very easy.

Picture This

With GeoWizard there is a handy little file that will take a screen shot minus the geoWizard menu across the top. I use geoWizDump for the screen shots I send with various articles and, since it runs from geoWizard, you can get shots of screens that don't allow access to Desk Accessories.

When I first sent Scott Eggleston a picture for the Underground (now merged with the Loadstar Letter) I sent him a WizDump Photo Scrap (you can save output as geoPaint or Photo Scrap files). Scott used geoPublish V1.0b and this scrap crashed his geoPublish when he pasted it on the page. My versions of geoPublish both took the scrap with no complaints. If you use V1.0b you will want to create WizDump 'Paint files and then use a utility like ScrapCan or Scrap It to cut out your Scrap.

Running And Stuffing

DA-Runner is another Jim Collette program that was initially a type-in in the June/July 1990 RUN magazine. This handy Desk Accessory lets you choose from up to 50 other Desk Accessories from any disk (and any drive) on your system. Check with CMD for this issue of RUN on paper or disk. The functionality the program provides is also an integral feature of geoWizard and Jim's Font Editor 2.5.

Also appearing on a ReRUN disk is Super Validate by Paul Murdaugh (Mar/Apr 1992). This utility program performs a disk validation but returns legible error messages if a file is bad. Armed with this knowledge, a disk editor (Maverick S.E. is a good GEOS based one) and the instructions, you may be able to resurrect some of your damaged files.

For those of us who don't own a battery backed REU or a RAMLink we require a method of copying files to our REU's when we boot. Files like the desktop, printer driver(s), favorite Desk Accessories and applications. I use John Howard's QwikStash. This auto-exec file copies whatever files I specify with its sister application, QwikPik.

One problem with QwikPik is it doesn't recognize odd-sized Gateway RAM Disks. To get around this limitation I set up the data files on my Gateway boot disks while running the normal Desktop. In this manner the system works great and prevents me from having to swap RAM drivers within Gateway.

Another very good REU stuffer is Jim Collette's (him again!) Batch Copier from the GEOS Companion disk. While this program isn't an auto-exec, it can be used in conjunction with Auto-Loader (also on GEOS Companion). When run during the GEOS boot procedure Batch Copier will scour the disk for a list file called AUTO COPY and place the files it specifies into RAM.

Be careful with this procedure. The file must be called AUTO COPY (all caps, one space between the two words), not Auto Copy as the manual states. I wrote to Jim shortly after getting the disk and having troubles, and that was his response (though I never saw any mention of this in RUN). These programs run under both GEOS 64 and 128.

That is it for now, so until next time enGEOy your Commodore! And remember, sometimes you just have to try things that aren't specified in the documentation in order to come up with new and unique ways to accomplish your tasks.

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Carrier Detect

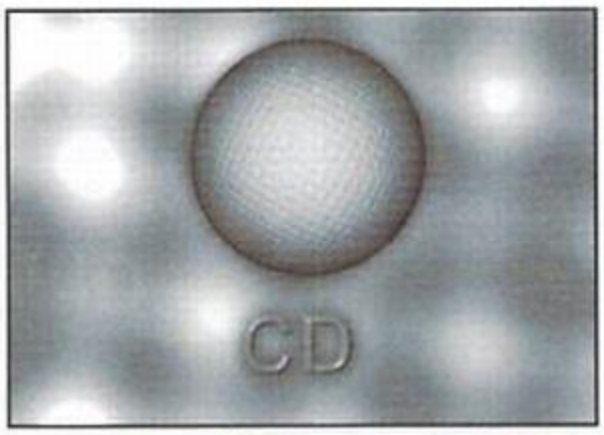
By Gaelyne R. Gasson

A SENSE OF COMMUNITY

What makes us so special? When I think of my favorite computer, I don't think about programs or typing commands, or what I see on the monitor. My first thoughts are usually about people—the Commodore community as a whole. It's something that goes beyond the hardware, beyond software, straight to the heart. Beyond the pages of this magazine and your local user group, there are other sections of the overall Commodore Community, such as Meeting C64/128 Users through the Mail, and a myriad of online communities where you can find support and COMaraderie with like (and not-so-like) minded people. When you plug in and turn on your modem, you're only a phone call away from some of the best of the Commodore Community.

Bulletin Boards

Your participation can really make a big difference to help keep our Commodore sysops happily administrating their systems. You may think that a local Commodore BBS would have a limited number of users and messages but this isn't the case since many BBS systems are networked with other systems to share messages from people around the country, and around the world. If the idea of phoning a BBS long distance doesn't appeal, you could consider setting up your own bulletin board networked with other boards. You would still have to connect long distance to pick up messages, but because it's an automatic



process it takes less time than it would for you to read and respond to messages online.

Non-Commodore BBS's

My first online experience was not with a Commodore bulletin board, but with a local BBS that offered support for Commodore users. You may not find a local BBS that explicitly states they support our computer platform, but chances are they participate in national and international networks that have some support for our computers. Fidonet is one such network that has three main Commodore related echoes: CBM, CBM-128, and CBM-GEOS. If you can't find these echoes on your local Fidonet BBS, ask your sysop to consider carrying them—support can be only a question away. Other networks that may have support include Rimenet and Othernet.

Online Services

There are three online services that we can access with our Commodores that have online Commodore communities. These are (in alphabetical order): CompuServe, Delphi, and Genie. Each of these services have Commodore communities with message areas, chat facilities and file support. Most offer at least some services that relate to the Internet as well (such as Email and access to the newsgroups). The online services can be good place to start out learning about using your modem and participating in messages areas, but many are slowly moving towards graphical access and not putting as much into the upkeep on the text side of things. At least one of the services (Delphi) offers the ability to access the Commodore forum areas (both chat and messages) from the World Wide Web for free, but because it uses frames, it's not easily navigated with Lynx.

Internet

There are several different Commodore communities on the Internet—some overlap, while others don't. A lot depends on your interests and preferences. For those who prefer messages, there's newsgroups (comp.sys.cbm and alt.c64), and mailing lists (there are several for the Commodore). Some prefer the chatting online and for this there's IRC and Delphi's Commodore forum chat area. Web Boards could be considered a cross between online messages and online chat. These are 'bulletin boards' on the World Wide Web that function by participants filling out forms and submitting them. Some Web Boards seem similar to a "Graffiti Board" on a BBS, others

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Contact; Tom Adams, (President)
4427 39TH ST
BRENTWOOD MD 20722-1022
tomadams@sysnet.net

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The Internet for Commodore C64/128 Users

3rd Edition
by Gaelyne R. Gasson
ISBN: 0-9585837-0-6

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are laid out with individual topics with or without threading messages with like topics together. A lot depends on the person who designed the Web Board and the programs they used to implement it. Commodore users can, and have designed their own Web Boards.

Telnet allows you to connect to other places on the Internet, some that you might not have realized are possible. For instance you can telnet to use a Delphi or CompuServe account, or telnet to a BBS to access Fidonet messages or telnet to another Internet provider to maintain a web or FTP site or make use of their online offerings.

Email gives us contact with hundreds of other Commodore users, outside of the realm of newsgroups, mailing lists, IRC or Web and Chat boards. Sometimes being able to reach someone who knows more about a specific topic can do wonders for solving problems or answering questions. It's another way we communicate with each other that helps us, and keeps our community strong.

What makes us special is the fact we communicate with each other. We share our discoveries as well as ask help for our problems. When the first User Groups were developed there was a sense of wonderment over the new hardware and new ways to try to do things with our computers. This sense of discovery has been extended to the online world. Come and join us!

Gaelyne Gasson is the author of "The Internet for Commodore C64/128 Users" and can be contacted via Email at gaelyne@cmdweb.com or visit her web site at: http://videocam.net.au/~gaelyne.

Online Community Resources For Commodore Users

Commodore BBS's

Batcave	(303) 252-0735	Ron Fick (rfick@nyx.net)	C-Net 128 CommNet network	
The 128 P.C.	(512) 940-0023	Tom Peranteau (tomp@gte.net)	C-Net 128	http://home1.gte.net/tomp/
Omni World128	(253) 536-9353	Brian Bell (bbell19@IDT.NET)	Omni EchoNet	
Civic 64/128	(805) 382-1125	Ben Holmes (bnholmes@rain.org)	Omni EchoNet	
The Vault	(416) 694-2193	Mark Wigston (thevault@mypad.com)	Centipede/ComLink, CommNet, Net64	
Inner Circle	(304) 697-0101	John Pinson (icebbs@ramlink.net)	Centipede/ComLink, CommNet, Net64	http://ram.ramlink.net/~icebbs/

Non-Commodore BBS's that support our Community

The Speed Zone	(517) 322-2386	Maurice Randall (arca93@delphi.com)	http://people.delphi.com/arca93/	(GEOS/Wheels support)
d'BUG	(718) 671-7050		http://www.mediaworks.com/bug/	(Fidonet)
221B Baker Street	(904) 862-8643			(Fidonet)

Online Services

Delphi	1-800-695-4002	support@delphi.com	http://www.delphi.com/	Forum: COM COM
(Telnet: delphi.com, Forum via Web: http://forums.delphi.com/m/main.asp?sigdir=commodore)				
Genie	1-800-638-8369	info@genie.com	http://www.genie.com	Forum: Commodore RT (M625)
CompuServe	1-800-848-8199	70006.101@compuserve.com	http://www.compuserve.com	Forum: CBMAPP
(Telnet: compuserve.com)				

Newsgroups

comp.sys.cbm
alt.c64

Internet Relay Chat (IRC)

#c-64	IRCnet
#c-64	Efnet

Mailing Lists

Commodor	listserv@ubvm.cc.buffalo.edu
Novaterm	novaterm-list@eskimo.com
Tifcu	tifcu-info@videocam.net.au

Telnet BBS's

Neverending BBS	bbs.neverending.com	(Fidonet Echos)
Cereal Port BBS	199.125.78.133	(Fidonet Echos)
Shuttle 64 BBS	shutle64.owt.com	(Commodore support)

Web Boards

Delphi	http://forums.delphi.com/m/main.asp?sigdir=commodore
Oasis	http://www.cgiforme.com/cgibin/oasiscomm/wwwboard.html
Brotkasten-Corner	http://www.8bit.com/discurse/THEMEN0.HTM
Waggs	http://www.InsideTheWeb.com/mbs.cgi/mb153941
TIFCU	http://videocam.net.au/tifcu/bb/
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CHECKSUM

Commodore World's Program Entry Checking Program and Tips on Entering Programs from this Magazine

CHECKSUM is a program that proofreads your typing when you enter a listing from the magazine. It assigns a numerical value to each character that you type, adds up the values of the line you typed and displays the sum. (Checksum, therefore, means that it checks your typing by summing the characters.) It also verifies that you have typed the characters in the proper order. (Checksum won't tell you if you miss a line of code entirely, so verify that yourself.) Checksum runs "in the background" when you type in lines of program code. Whenever you type a line and press RETURN, Checksum will display a value. Compare that value to the value published next to the line of code in the magazine. If the numbers match, you've typed the line correctly. Simple.

Typing in CHECKSUM

First, type in Checksum carefully from the listing on this page. Be sure to press RETURN after every line to enter it into memory. Once you have typed the program, *save it*. In fact, save it a few times while you're typing, just to be safe. (This is good advice whenever you type in a program. I usually change the name each time I save; for example, Checksum1, Checksum2, and so on.) Double-check your work, making sure that you've typed in every line and that you've pressed RETURN after every line you've typed. If you make errors when typing in Checksum, a test run of Checksum will tell you which line is incorrect. (This safety feature works only in the Checksum program itself, and does not apply to any other listings in the magazine.) Whenever you find a typing error (in any program listing), fix it, press RETURN to enter the change, save the program again and try another run. Repeat this process as often as necessary. Important tip: Don't get discouraged if the program won't run. Be patient. Be thorough. It will work eventually. You'll know your Checksum is ready when you see the line:

```
TO TOGGLE ON OR OFF, SYS XXXX
```

Entering Programs Using CHECKSUM

When you're ready to type in your first listing from the magazine, load and run Checksum. Make a note of the number that is displayed on the screen (49152 for the C-64; 3328 for the C-128). To activate and deactivate Checksum, type SYS followed by that number, then press RETURN. You need to have Checksum active whenever you're typing in a listing. Checksum must be deactivated, however, when you run the new program. The next step is typing in a new program listing as it appears in the magazine.

As you begin, you'll notice that to the left of the start of each line is a number. Don't type this number in: It's simply the Checksum value. Stop typing at the end of the program line and press RETURN. If you've typed the line correctly, the number displayed on the screen will match the Checksum value. If the numbers don't match, you've made a mistake. Check the line carefully, make your changes and press RETURN. The computer won't know you've made a change unless you press RETURN on the changed line to enter it. A few type-in hints: The Checksum does not verify blank spaces in the program lines unless they are within quotation marks, because adding or omitting such spaces will not affect the operation of the program. The exception to this is hexadecimal Data statements. These are the Data statements, such as this one, that don't have commas:

```
100 DATA 123456789012345678901234567890*123456789012345
67890*12345678901234567890*
```

In statements such as these, you must have one space between the word DATA and the numbers that follow. Checksum will not catch that error.

Special Key Combinations

As you type, you may be confused the first time you see curly braces {}. These braces mean "perform the function explained within." For example, {22 SPACES} means that you need to press the space bar 22 times. Don't type the braces (you can't, of course, because there are no curly braces in the Commodore character set). Here are some other common examples:

{CLEAR/HOME}	hold down the SHIFT key and press the CLR-HOME key.
{2 CRSR DN}	tap the cursor down key twice.
{CTRL i}	hold the CONTOL key and press the I key.
{CMDR t}	hold down the COMMODORE key and press the T key.

Continue typing in your program, saving often and checking each checksum value with the one in the magazine, until you've finished the listing. Phew! So now you're ready to run your program, right? Not quite. First, save it. Second, deactivate Checksum by typing SYS followed by 49152 for the C-64 or 3328 for the C-128. Now you can run. Don't be discouraged if you still get an error. It happens. Use Checksum faithfully. Be patient. Be thorough. It will work eventually.

CHECKSUM

```
100 rem cw checksum 64/128
110 mo=128:sa=3328
120 if peek(65533)<>255 then mo=64:sa=49152
130 i=0:ck=0:ch=0:ln=300
140 for k=0 to 16
150 for j=1 to 10
160 read b:if b>255 then goto 280
170 ch=ch+b:poke sa+i,b:i=i+1
180 next j
190 read lc:if lc<>ch then goto 280
200 ch=0:ln=ln+10
210 next k
220 pokesa+110,240:pokesa+111,38:pokesa+140,234
230 printchr$(147):print"cw checksum";str$(mo):print
240 print"to toggle on or off, sys";sa:if mo=128 then 270
250 pokesa+13,124:pokesa+15,165:pokesa+25,124:pokesa+26,165
260 pokesa+39,20:pokesa+41,21:pokesa+123,205:pokesa+124,189
270 pokesa+4,int(sa/256):sys sa:new
280 print"you have a data error in line";ln;"!":end
290 rem do not change these data statements!
300 data 120,162,24,160,13,173,4,3,201,24,884
310 data 208,4,162,13,160,67,142,4,3,140,903
320 data 5,3,88,96,32,13,67,152,72,169,697
330 data 0,141,0,255,133,176,133,180,166,22,1206
340 data 164,23,134,167,132,168,170,189,0,2,1149
350 data 240,58,201,48,144,7,201,58,176,3,1136
360 data 232,208,240,189,0,2,240,42,201,32,1386
370 data 208,4,164,180,240,31,201,34,208,6,1276
380 data 165,180,73,1,133,180,230,176,164,176,1478
390 data 165,167,24,125,0,2,133,167,165,168,1116
400 data 105,0,133,168,136,208,239,232,208,209,1638
410 data 169,42,32,210,255,165,167,69,168,170,1447
420 data 169,0,32,50,142,169,32,32,210,255,1091
430 data 32,210,255,169,13,32,210,255,104,168,1448
440 data 96,104,170,24,32,240,255,104,168,96,1289
450 data 56,32,240,255,138,72,152,72,24,162,1203
460 data 0,160,0,32,240,255,169,18,208,198,1280
```


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816 BEAT

NEW COMMANDS PROVIDED BY THE 65816 PROCESSOR

By Doug Cotton

A number of requests have come in lately about the 65816 commands, and while we did present a rather terse listing of the full command set back in Commodore World Issue#16, that list probably created as many questions as it answered. With that in mind, we have created a more detailed instruction list over the last few weeks, and have included the 65816-specific commands from that list in this installment of 816 BEAT. The full list of all instructions is being converted to a format that we can put on our web site, but we'll also try to publish it (space permitting) in a future issue of Commodore World. Meanwhile, we hope that the abbreviated set of command provided here will provide some temporary relief.

BRA *Branch Always*

Desc: Offsets the Program Counter by the 8-bit signed value specified in the operand.

Flags: None affected

Syntax	Opcode	Addressing Mode	6502	65C02	65816	Bytes	Cycles
BRA *nearlabel*	80	Program Counter Relative	√	√		2	3[2]

BRL *Branch Long Always*

Desc: Offsets the Program Counter by the 16-bit signed value specified in the operand.

Flags: None affected

Syntax	Opcode	Addressing Mode	6502	65C02	65816	Bytes	Cycles
BRL *label*	82	Program Counter Relative Long			√	3	4

COP *Co-Processor Enable*

Desc: Pushes the Program Bank Register (PBR) onto the stack (65816 Native mode only), increments the Program Counter by 2 and pushes it onto the stack, pushes the Processor Status Register (P) onto the stack, sets the Interrupt Disable flag (i), sets the Program Bank Register (PBR) to $00 (65816 in Native mode) and loads the Program Counter with the values from the COP Vector ($00FFE4-00FFE5). The Decimal Mode flag (d) is reset to 0 after a COP is executed.

Flags: d The Decimal flag is cleared
i The Interrupt Disable flag is set

Syntax	Opcode	Addressing Mode	6502	65C02	65816	Bytes	Cycles
COP *const*	02	Stack/Interrupt			√	2[3]	7[5]

JML *Jump Long*

Desc: Loads the Program Counter and Program Bank Register (PBR) with the address specified by the operand.

Flags: None affected

Syntax	Opcode	Addressing Mode	6502	65C02	65816	Bytes	Cycles
JML *long*	5C	Absolute Long			√	4	4
JML *[addr]*	DC	Absolute Indirect Long			√	3	6

JSL *Jump to Subroutine Long*

Desc: Pushes the Program Bank Register (PBR) onto the stack, pushes the return address on the stack (in standard low byte/high byte format), then loads the Program Counter and Program Bank Register (PBR) with the address specified by the operand.

Flags: None affected

Syntax	Opcode	Addressing Mode	6502	65C02	65816	Bytes	Cycles
JSL *long*	22	Absolute Long			√	4	8

MVN *Block Move Negative*

Desc: Moves memory contents starting with the location specified in the X register and the bank specified in the operand (srcbk), placing the moved contents starting at the address in the Y register and bank specified in the operand (destbk) until the number of bytes moved is equal to the initial value in the 16-bit Accumulator (C) plus one (1).

Notes: (1) MVN cannot cross a Bank boundry.
(2) If the source and destination address ranges overlap and the starting address of the destination range is higher than the starting address of the source range, use MVP instead of MVN.
(3) The Data Bank Register (DBR) is destroyed during this process.

Flags: None affected

Registers: .X Starting address of source range
.Y Starting address of destination range
.C Transfer Length-1

Syntax	Opcode	Addressing Mode	6502	65C02	65816	Bytes	Cycles
MVN *srcbk,destbk*	54	Block Move			√	3	1[3]

Note: The syntax for the block move command shown above is the accepted assembler syntax. However, the true order of the bytes in machine language are (1) instruction code, (2) destination bank and (3) source bank.

MVP *Block Move Positive*

Desc: Moves memory contents starting with the location specified in the X register and the bank specified in the operand (srcbk), placing the moved contents starting at the address in the Y register and bank specified in the operand (destbk) until the number of bytes moved is equal to the initial value in the 16-bit Accumulator (C) plus one (1).

Notes: (1) MVP cannot cross a Bank boundry.
(2) If the source and destination address ranges overlap and the starting address of the destination range is lower than the starting address of the source range, use MVN instead of MVP.
(3) The Data Bank Register (DBR) is destroyed during this process.

Flags: None affected

Registers: .X Ending address of source range
.Y Ending address of destination range
.C Transfer Length-1

Syntax	Opcode	Addressing Mode	6502	65C02	65816	Bytes	Cycles
MVP *srcbk,destbk*	44	Block Move			√	3	1[3]

Note: The syntax for the block move command shown above is the accepted assembler syntax. However, the true order of the bytes in machine language are (1) instruction code, (2) destination bank and (3) source bank.

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PEA *Push Effective Absolute Address*

Desc: Copies a 16-bit address specified by the operand into the stack and decrements the stack pointer by two. This instruction acts more like an immediate mode instruction, since the data placed on the stack is the immediate data of the operand itself, rather than the data stored in the absolute address pointed to by the operand. The high byte is pushed first, followed by the low byte.

Flags: None affected

Syntax	Opcode	Addressing Mode	6502	65C02	65816	Bytes	Cycles
PEA *addr*	F4	Stack (Absolute)			√	3	5

PEI *Push Effective Indirect Address*

Desc: Copies a 16-bit address into the stack and decrements the stack pointer by two. The address copied into the stack is the value found at an effective address formed by using the operand as an offset to the Direct Page (DP) register. The high byte (from the effective address+1) is pushed first, followed by the low byte (from the effective address).

Flags: None affected

Syntax	Opcode	Addressing Mode	6502	65C02	65816	Bytes	Cycles
PEI (*dp*)	D4	Stack (DP Indirect)			√	2	6[7]

PER *Push Effective PC Relative Indirect Address*

Desc: Copies a 16-bit address into the stack and decrements the stack pointer by two. The address copied into the stack is formed by using the immediate data in the operand as a signed 16-bit offset to the current contents of the Program Counter. The high byte is pushed first, followed by the low byte.

Flags: None affected

Syntax	Opcode	Addressing Mode	6502	65C02	65816	Bytes	Cycles
PER *label*	62	Stack (PC Relative Long)			√	3	6

PHB *Push Data Bank Register*

Desc: Copies the 8-bit contents of the Data Bank Register (DBR) into the stack and decrements the stack pointer.

Flags: None affected

Syntax	Opcode	Addressing Mode	6502	65C02	65816	Bytes	Cycles
PHB	8B	Stack (Push)			√	1	3

PHD *Push Direct Page Register*

Desc: Copies the contents of the 16-bit Direct Page register (DP) into the stack and decrements the stack pointer. The high byte is pushed first, followed by the low byte.

Flags: None affected

Syntax	Opcode	Addressing Mode	6502	65C02	65816	Bytes	Cycles
PHD	0B	Stack (Push)			√	1	4

PHK *Push Program Bank Register*

Desc: Copies the contents of the 8-bit Program Bank Register (PBR) into the stack and decrements the stack pointer.

Flags: None affected

Syntax	Opcode	Addressing Mode	6502	65C02	65816	Bytes	Cycles
PHK	4B	Stack (Push)			√	1	3

PHX *Push Index Register X*

Desc: Copies the contents of the X register into the stack and decrements the stack pointer.

Flags: None affected

Size: 6502, 65C02 and 65816 in Emulation mode: 8-bit
65816 in Native mode (x = 1): 8-bit
65816 in Native mode (x = 0): 16-bit (high byte is pushed first, followed by the low byte)

Syntax	Opcode	Addressing Mode	6502	65C02	65816	Bytes	Cycles
PHX	DA	Stack (Push)		√	√	1	3[10]

PHY *Push Index Register Y*

Desc: Copies the contents of the Y register into the stack and decrements the stack pointer.

Flags: None affected

Size: 6502, 65C02 and 65816 in Emulation mode: 8-bit
65816 in Native mode (x = 1): 8-bit
65816 in Native mode (x = 0): 16-bit (high byte is pushed first, followed by the low byte)

Syntax	Opcode	Addressing Mode	6502	65C02	65816	Bytes	Cycles
PHY	5A	Stack (Push)		√	√	1	3[10]

PLB *Pull Data Bank Register*

Desc: Copies the current stack byte into the Data Bank (DBR) register, and increments the stack pointer.

Flags: n The Negative flag mirrors the most significant bit of the value loaded
z The Zero flag is set if the value loaded is equal to zero, cleared if not equal to zero

Syntax	Opcode	Addressing Mode	6502	65C02	65816	Bytes	Cycles
PLB	AB	Stack (Pull)			√	1	4

PLD *Pull Direct Page Register*

Desc: Copies two bytes from the current stack location into the Direct Page (DP) register, and increments the stack pointer. The low byte is pulled first, followed by the high byte.

Flags: n The Negative flag mirrors the most significant bit of the value loaded
z The Zero flag is set if the value loaded is equal to zero, cleared if not equal to zero

Syntax	Opcode	Addressing Mode	6502	65C02	65816	Bytes	Cycles
PLD	2B	Stack (Pull)			√	1	5

PLX *Pull Index Register X*

Desc: Copies the current word from the stack into the X register and increments the stack pointer. The word size is determined by the processor type and operating mode.

Flags: n The Negative flag mirrors the most significant bit of the value loaded
z The Zero flag is set if the value loaded is equal to zero, cleared if not equal to zero

Size: 6502, 65C02 and 65816 in Emulation mode: 8-bit
65816 in Native mode (x = 1): 8-bit
65816 in Native mode (x = 0): 16-bit (low byte is pulled first, followed by the high byte)

Syntax	Opcode	Addressing Mode	6502	65C02	65816	Bytes	Cycles
PLX	FA	Stack (Pull)			√	1	4[10]

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PLY *Pull Index Register Y*

Desc: Copies the current word from the stack into the Y register and increments the stack pointer. The word size is determined by the processor type and operating mode.

Flags:
- n The Negative flag mirrors the most significant bit of the value loaded
- z The Zero flag is set if the value loaded is equal to zero, cleared if not equal to zero

Size:
- 6502, 65C02 and 65816 in Emulation mode: 8-bit
- 65816 in Native mode (x = 1): 8-bit
- 65816 in Native mode (x = 0): 16-bit (low byte is pulled first, followed by the high byte)

Syntax	Opcode	Addressing Mode	6502	65C02	65816	Bytes	Cycles
PLY	7A	Stack (Pull)		√	√	1	4[4]

REP *Reset Processor Status Bits*

Desc: Clears bits in the Processor status register (P) according to the bits set in the operand. Any bit in the operand which is set will clear the corresponding bit in the Processor status register, while unset bits remain unaffected.

Flags: All flags per operand except the Break (b) flag (65816 in Emulation mode) and the hidden Emulation (e) flag.

Syntax	Opcode	Addressing Mode	6502	65C02	65816	Bytes	Cycles
REP #const	C2	Immediate			√	2	3

RTL *Return from Subroutine Long*

Desc: Pulls the 16-bit Program Counter (PC) value from the stack, increments it by one and places it in the Program Counter (PC), pulls the Program Bank Register (PBR) value from the stack, places it in the Program Bank Register (PBR) and increments the stack pointer by 3 bytes.

Flags: None affected

Syntax	Opcode	Addressing Mode	6502	65C02	65816	Bytes	Cycles
RTL	6B	Stack (RTL)			√	1	6

SEP *Set Processor Status Bits*

Desc: Sets bits in the Processor status register (P) according to the bits set in the operand. Any bit in the operand which is set will set the corresponding bit in the Processor status register (P), while unset bits remain unaffected.

Flags: All flags per operand except the Break (b) flag (65816 in Emulation mode) and the hidden Emulation (e) flag.

Syntax	Opcode	Addressing Mode	6502	65C02	65816	Bytes	Cycles
SEP	E2	Immediate			√	2	3

STP *Stop Processor*

Desc: Waits until the next Phase 2 cycle, then stops the 65816's clock oscillator. A hardware reset of the 65816 is required to restart the processor.

Flags: None affected

Syntax	Opcode	Addressing Mode	6502	65C02	65816	Bytes	Cycles
STP	DB	Implied			√	1	3[4]

TCD *Transfer 16-bit Accumulator to Direct Page Register (Alias: TAD)*

Desc: Copies the contents of the 16-bit Accumulator (C) into the Direct Page register (DP).

Flags:
- n The Negative flag mirrors the most significant bit of the tranferred value
- z The Zero flag is set if the value tranferred is equal to zero, cleared if not equal to zero

Syntax	Opcode	Addressing Mode	6502	65C02	65816	Bytes	Cycles
TCD	5B	Implied			√	1	2

TCS *Transfer Accumulator to Stack Pointer (Alias: TAS)*

Desc: Copies the contents of the Accumulator into the Stack Pointer.

Flags: None affected

Size:
- 6502, 65C02 and 65816 in Emulation mode: 8-bit transfer (high byte of stack pointer on 65816 is forced to page one)
- 65816 in Native mode: 16-bit transfer

Syntax	Opcode	Addressing Mode	6502	65C02	65816	Bytes	Cycles
TCS	1B	Implied			√	1	2

TDC *Transfer Direct Page Register to 16-bit Accumulator (Alias: TDA)*

Desc: Copies the contents of the Direct Page register (DP) into the 16-bit Accumulator (C).

Flags:
- n The Negative flag mirrors the most significant bit of the tranferred value
- z The Zero flag is set if the value tranferred is equal to zero, cleared if not equal to zero

Syntax	Opcode	Addressing Mode	6502	65C02	65816	Bytes	Cycles
TDC	7B	Implied			√	1	2

TRB *Test and Reset Memory Bits Against Accumulator*

Desc: Sets bits in the location specified by the operand for which the corresponding bits in the Accumulator are set (equal to 1). Operand location bits for which the corresponding bits in the Accumulator are unset (0) are left unaffected.

Flags: z The Zero flag is set if the result of ANDing the Accumulator with final contents of the location specified by the operand is equal to zero, cleared if not equal to zero

Size:
- 6502, 65C02 and 65816 in Emulation mode: 8-bit
- 65816 in Native mode (m = 1): 8-bit
- 65816 in Native mode (m = 0): 16-bit (low byte at effective address, high byte at effective address+1)

Syntax	Opcode	Addressing Mode	6502	65C02	65816	Bytes	Cycles
TRB *dp*	14	Direct Page		√	√	2	5[3,4]
TRB *addr*	1C	Absolute		√	√	3	6[3]

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TSB *Test and Set Memory Bits Against Accumulator*

Desc: Clears bits in the location specified by the operand for which the corresponding bits in the Accumulator are set (equal to 1). Operand location bits for which the corresponding bits in the Accumulator are unset (0) are left unaffected.

Flags: z The Zero flag is set if the result of ANDing the Accumulator with final contents of the location specified by the operand is equal to zero, cleared if not equal to zero

Size:
6502, 65C02 and 65816 in Emulation mode: 8-bit
65816 in Native mode (m = 1): 8-bit
65816 in Native mode (m = 0): 16-bit (low byte at effective address, high byte at effective address+1)

Syntax	*Opcode*	*Addressing Mode*	*6502*	*65C02*	*65816*	*Bytes*	*Cycles*
TSB *dp*	04	Direct Page	√	√		2	5[2,5]
TSB *addr*	0C	Absolute	√	√		3	6[5]

TSC *Transfer Stack Pointer to 16-bit Accumulator*

Desc: Copies the contents of the Stack Pointer into the 16-bit Accumulator (C).

Flags: n The Negative flag mirrors the most significant bit of the tranferred value
z The Zero flag is set if the value tranferred is equal to zero, cleared if not equal to zero

Syntax	*Opcode*	*Addressing Mode*	*6502*	*65C02*	*65816*	*Bytes*	*Cycles*
TSC	3B	Implied			√	1	2

TXY *Transfer Index Register X to Index Register Y*

Desc: Copies the contents of the X register into the Y register.

Flags: n The Negative flag mirrors the most significant bit of the tranferred value
z The Zero flag is set if the value tranferred is equal to zero, cleared if not equal to zero

Size:
6502, 65C02 and 65816 in Emulation mode: 8-bit
65816 in Native mode (x = 1): 8-bit
65816 in Native mode (x = 0): 16-bit

Syntax	*Opcode*	*Addressing Mode*	*6502*	*65C02*	*65816*	*Bytes*	*Cycles*
TXY	9B	Implied			√	1	2

TYX *Transfer Index Register Y to Index Register X*

Desc: Copies the contents of the Y register into the X register.

Flags: n The Negative flag mirrors the most significant bit of the tranferred value
z The Zero flag is set if the value tranferred is equal to zero, cleared if not equal to zero

Size:
6502, 65C02 and 65816 in Emulation mode: 8-bit
65816 in Native mode (x = 1): 8-bit
65816 in Native mode (x = 0): 16-bit

Syntax	*Opcode*	*Addressing Mode*	*6502*	*65C02*	*65816*	*Bytes*	*Cycles*
TYX	BB	Implied			√	1	2

WAI *Wait for Interrupt*

Desc: Pulls the RDY pin low in the third instruction cycle and places the processor in a low power mode until interrupted by an external source (NMI, IRQ, ABORT or RESET).

Flags: None affected

Syntax	*Opcode*	*Addressing Mode*	*6502*	*65C02*	*65816*	*Bytes*	*Cycles*
WAI	CB	Implied			√	1	3[13]

WDM *Reserved for Future Expansion*

Desc: This opcode has been reserved for future expansion to the 65xxx family of processors. While this instruction currently produces a two-byte NOP, it should not be used at this time to avoid compatibility problems.

Flags: None affected

Syntax	*Opcode*	*Addressing Mode*	*6502*	*65C02*	*65816*	*Bytes*	*Cycles*
WDM	42	n/a			√	2[16]	n/a[16]

XBA *Exchange B and A 8-bit Accumulators*

Desc: Swaps the high byte (B) of the Accumulator (C) with the low byte (A).

Flags: n The Negative flag mirrors the most significant bit of the tranferred value
z The Zero flag is set if the value tranferred is equal to zero, cleared if not equal to zero

Syntax	*Opcode*	*Addressing Mode*	*6502*	*65C02*	*65816*	*Bytes*	*Cycles*
XBA	EB	Implied			√	1	3

XCE *Exchange Carry and Emulation Flags*

Desc: Exchanges the contents of the Carry (c) and Emulation (e) flags in the Processor status register (P). Generally used to switch between the 65816's Emulation and Native modes.

Flags: m Set when entering Native mode, set but not used when entering Emulation mode
x Set when entering Native mode, becomes Break flag in Emulation mode
b Set when entering Emulation mode, becomes Memory/Accumulator flag (m) in Native mode
c Contains the previous contents of the Emulation flag (e)
e Contains the previous contents of the Carry flag (c)

Syntax	*Opcode*	*Addressing Mode*	*6502*	*65C02*	*65816*	*Bytes*	*Cycles*
XCE	FB	Implied			√	1	2

Additional Notes

[1] Add 1 cycle if m=0 (16-bit memory/accumulator)
[2] Add 1 cycle if low byte of Direct Page Register is non-zero
[3] Add 1 cycle if adding index crosses a page boundary
[4] Add 1 cycle if 65C02 and d=1 (65C02 in decimal mode)
[5] Add 2 cycles if m=0 (16-bit memory/accumulator)
[6] Subtract 1 cycle if 65C02 and no page boundary crossed
[7] Add 1 cycle if branch is taken
[8] Add 1 cycle if branch taken crosses page boundary on 6502, 65C02, or 65816's 6502 emulation mode (e=1)
[9] Add 1 cycle for 65816 native mode (e=0)
[10] Add 1 cycle if x=0 (16-bit index registers)
[11] Add 1 cycle if 65C02
[12] 6502: Yields incorrect results if low byte of operand is $FF (i.e., operand is $xxFF)
[13] 7 cycles per byte moved
[14] Uses 3 cycles to shut the processor down: additional cycles are required by reset to restart it
[15] Uses 3 cycles to shut the processor down: additional cycles are required by interrupt to restart it
[16] Byte and cycle counts subject to change in future processors which expand WDM into 2-byte opcode portions of instructions of varying lengths
[17] Add 1 byte if m=0 (16-bit memory/accumulator)
[18] Opcode is 1 byte, but program counter value pushed onto stack is incremented by 2 allowing for optional signature byte
[19] Add 1 byte if x=0 (16-bit index registers)

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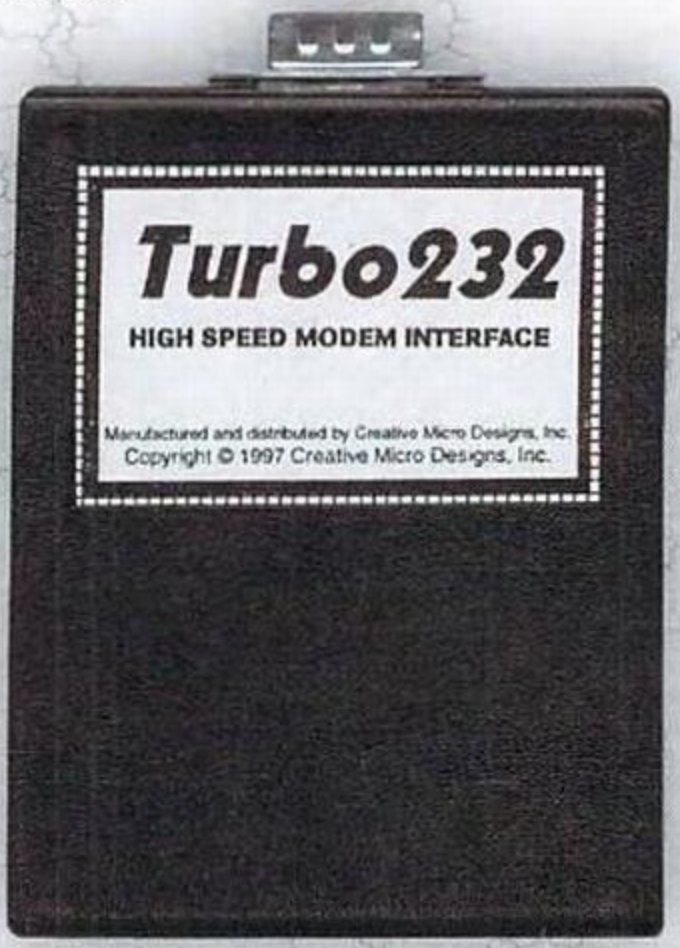
Turbo232
HIGH SPEED MODEM INTERFACE
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